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THE AMERICAN GAS LIGHT JOURNAL

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[OFFICIAL NOTICE.]

September Meeting, Society of Gas Lighting.

OFFICE OF THE SECRETARY, Sept. 1, 1898.

The September meeting of the Society of Gas Lighting will be held in "The Arena," No. 39 West 31st street, New York city, at 3 P.M. of the 8th inst.

FRED. S. BENSON, Secretary.

[OFFICIAL NOTICE.]

September Meeting, Guild of Gas Managers.

OFFICE OF THE SECRETARY, Sept. 2, 1898.

The September meeting of the Guild of Gas Managers will be held in Young's Hotel, Boston, Mass., at noon of the 10th inst.

A. K. QUINN, Secretary.

BRIEFLY TOLD.

THE EDUCATIONAL WORK OF THE AMERICAN ASSOCIATION.—During this summer (JOURNAL, last week in July and first week in August), we had occasion to refer to the permanent educational work in American gas engineering, proposed by the American Gas Light Association, through its Special Committee, which Committee appealed to the industry at large for the subscription of a fund, in guarantees of a 5-year period, that would enable the Association to carry on the educational gas engineering work started by it to a satisfactory and successful conclusion. So far, the appeal of the Committee seems to have met with only a midway response; which means that few have replied, many are waiting and more are dumb. So far as we have accurate information, the subscribers to the fund (which the Committee meant should not yield less than $3,000 per annum, for a period of 5 years) have pledged an amount equal to the return of $700 per year. This list is headed by Mr. Walton Clark, who pledges $200 per year; and the second subscriber in point of value is the Cleveland Gas Light and Coke Company, with its pledge of $100 per year. In the balance of the list is the JOURNAL, whose subscription of $25 per year, for the full period of 5 years, will be doubled should the Committee see fit to call for such doubling. It looks to us that the industry fails to appreciate the importance of this proposition, which really means that other centers of tuition, supported by subscription and interest return, having omitted to create "gas chairs," the gas industry proposes, out of its own resources to teach youngsters how to make and sell gas, according to scientific method and commonsense practice. There should be no difficulty experienced in securing the asked for $3,000 per annum, for a period of 5 years, for expenditure in the channel indicated, since not a subscriber to the fund could exist that would not be benefited fourfold over such subscription in the net results to the industry. It is true that no more exact or stable industry than the gas business exists, and that it may still and yet more enlarge, those who are to take it up where their predecessors ended should have qualifications at least equal to those who pioneered. The American Association's proposed fund is meant for such advancement alone, and our advocacy of the scheme means neither betterment nor advantage for ourselves, save that which comes to us through the knowledge that gas goes on triumphant. The

American Association has a Secretary who is paid a certain salary—something over $500 per annum; why not ask that Secretary to assume charge of the work of the Association (to the exclusion of any other business or service), his duties hereafter to include the task of directing the work of its educational bureau? The plan would be a good one; the subscription to enable it would be as nothing ($5 a year on the average) to the responsible companies of the country; and its beneficial results would be simply incalculable to the industry as a whole. Coal gas men and water gas men may share alike in this copartnership, without acquisition of jealousy or feeling of disadvantage. In proof whereof send on your subscriptions either to Mr. Clark, of the United Gas Improvement Company, Philadelphia; or to Mr. Geo. G. Ramsdell, of the American Gas Company, Philadelphia. Not that either will be the final custodian of the moneys, since that is a matter for the determination of the Association, although either and both would render a good account of their stewardship. Just look calmly over the conditions of this proposition, as presented in the JOURNAL for the last week of July and the first week of August.

NOTES.—Our review of the sixth edition of "Newbigging's Handbook for Gas Engineers and Managers" is postponed for another week. At the present writing we are unable to say what the cost thereof to American "gas engineers and managers" may be.——The Washington (D. C.) Company is completing its main piping in the Takoma district. ——Superintendent Andrews, of the Galion (O.) Gas Company, despite the "disinterested opposition" of Councilman Schaefer, has managed to make considerable main extensions in the place named.——At the annual meeting of the Ogden Gas Company, of Chicago, no change was made in the executive management.——There is quite an interesting contest on for control in the ownership of the Cape Island Gas Company, of Cape May, N. J. The Franklin Electric Light Company, of Cape May, is the aggressor.——Supt. Dunbar, of the Pittsfield (Mass.) Company, is engaged in enlarging the generating capacity of the plant, and is also overlooking notable additions to the main system.

Smoke Preventing Apparatus.

The *Gas World* says that the first prize in the recent protracted competition for smoke consuming or smoke preventing apparatus in Paris was won by M. J. Hinstin, who has also received for his apparatus a medal in silver from the Société d'Encouragement. The apparatus is simple and needs no tubular bars or shifting grate. The guiding idea is that the fire gases and the coke are each burned up at the place and in the way which suits each best; an idea brought to light by Combes more than 40 years ago. The fresh coal is put on in front, upon the previously carbonized coal; the heating and distillation of the fresh coal take place in a good draught, of which some traverses the hearth and the coal, while the rest, coming in through holes in the charging door, passes over the surface of the fuel. The ashpit is divided into two by a vertical partition, so that less air can get to the back of the fire from underneath than gets to the front. The coal gas from the coal is mixed with the air, and the flame is reflected by a fireclay roof above the hearth. The coal is so stoked as to be flat topped behind and heaped in front. The reflected flame descends upon the flat topped part of the fuel, which is practically coke in a thick layer, thick because the grate is sloped somewhat downwards and backwards, this insuring a great mass of incandescent material in the middle of the furnace. Further on the grate slopes upwards and backwards, so that the coke now becomes thinner as we recede from the charging door, and this part of the grate is hinged. Towards one point above the back of the hearth come three currents of gas: the coal gas and air flame from the fresh coal, almost horizontally; the products from the half spent coal at the middle; and the products from the coke at the back. These are burned amid very refractory firebrick. With this arrangement the amount of smoke was about one-fourth what it would have been in an ordinary grate.

Natural Gas in Indiana.

Mr. J. C. Leach, the supervisor of natural gas for the State of Indiana, in his last report respecting the existing conditions of the gas field, says: The natural gas field of the State originally embraced almost 3,000 square miles. To day the productive area is less than half that size. The average rock pressure was in the beginning 325 pounds, to-day it is less than 200 pounds. In the heart of the field, an area of 250 square miles, located in Grant, Madison, Blackford and Delaware counties, the pressure decreased 30 pounds in 1897, and now averages but 215 pounds, while in these four counties, which are the most productive of the entire field, the average pressure is but 200 pounds. The decrease in rock pressure, added to that of an exhaustion of one-half of the original productive area and the constant encroachment of salt water toward the center of the field, all point to the final exhaustion of the supply.

[OFFICIAL REPORT—REVISED BY THE SECRETARY—Continued from Page 310.]

SIXTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD AT SAN FRANCISCO, CAL., JULY 19 AND 20, 1898.

SECOND DAY, JULY 20, AFTERNOON SESSION.

The President announced that the proceedings of the afternoon of the second day would be commenced by the presentation of the

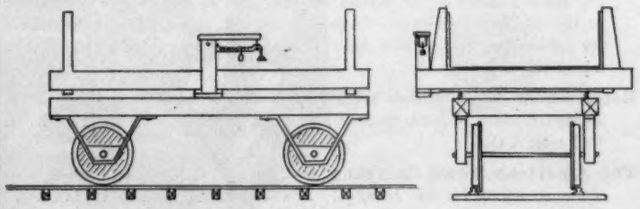
WRINKLES

that had been collected by the Wrinkle Editor, Mr. Geo. H. Hollidge.

The Secretary remarked that it might be advisable to discuss each Wrinkle after it was read, in order that those who were in doubt as to the application of the particular device under consideration could have the matters explained to them.

Editor Hollidge—The report of the Wrinkle Department, which is herewith submitted for your inspection and consideration, has been fairly responded to by the members of the Association, and preliminary to its presentation I desire to express my personal thanks to those who have so cheerfully, capably and practically replied to contribute to this division of our proceedings. Meantime it might be in order to remark that if others with new ideas would report their formulation to us, even greater interest would be created in this special section of our meetings, to our mutual advantage and greater benefit. Our present budget is:

No. 1.—*A Scale Coal Truck;* by R. Cardiff.—Mr. R. Cardiff, of the Santa Cruz Gas Company, has kindly submitted a drawing of a coal wagon, now in daily operation at his works, which consists of a truck, built on four flange wheels or axles, and a scale mounted on the truck with a platform built on the scale itself. It is very neat and simple in construction and operation. A day's coal can be hauled into the retort



Wrinkle No. 1.

house in one load, thereby dispensing with the wheelbarrow for coal use, and enabling an accurate coal account to be kept each day in one load. There is no waste or litter from the coal shed to the retort house. The scale on the truck is a new departure to many that can be copied by many superintendents with good results and little expense, especially in small works.

Mr. Osborne—It seems to me the finest point of that Santa Cruz wrinkle is not brought out in the description. In charging a bench of 3's, 250 pounds to the charge, you take off 250 pounds, and the scales tip the minute the 250 pounds are off, so the stoker knows he has the accurate weight in that retort. That to me is the finest point in the wrinkle.

Mr. Cardiff—The plan is simply a regular set of scales, taking the parts out and putting them into the car and using the bed of the car as a platform; in fact, it is the same as a platform scales. It does not take up any room. The charge can be weighed and the amount of coal you want to put in in each retort can be weighed separately. You do not have to run your car around on the scales to weigh the coal.

Mr. Clements—For instance, if you want to put 250 pounds in each retort, in a bench of 4's, you have 1,000 pounds on a car, and the scales are set so that you can draw each 250 pounds until the entire lot is completed?

Mr. Cardiff—Until it is all gone.

No. 2.—*A Fork for Holding Up the Coal While Clinkering a Generator;* by G. H. Hollidge.—This small device is a fork to be used in clinkering small generators. The fork (Fig. 2) is made of ½-inch or ⅝-inch round rod, steel or iron. The prongs are forged to fit the bar and so made that they can be bolted to the bar in order that each prong can be removed and straightened when necessary. When the fork is pushed into the hot coal from the top of the door, slanting down as shown in Fig. 1, this will hold the fork in place giving time to remove the

clinker. The handle of the fork is hooked by the coal hoist chain, as shown, and pulled up tight. Its use saves time and fuel. It is very handy should a clinker form when operating.

Mr. Hollidge—I would say in relation to this that one night while operating my generator I was caught with a clinker in its middle, and if there is a few degrees between that and Hades I believe that night I felt the degrees. I had to unload the whole thing in order to get at the clinker. I never saw such a mass of clinkers in any small generator in my life. Mr. Grant was there and gave me much assistance, but I made up my mind I would never be caught in that fix again. Since then I have met no trouble and no coal has been wasted.

Mr. Osborne—You did not find that the small rod was melted down in such a hot fire.

Mr. Hollidge—No; not while I am clinkering. I never had it in a very hot fire. I was caught once, but never was caught since.

No. 3.—*A Combination of Wrinkles.*—This is a combination of wrinkles offered by one of the members who desires that no mame should be used. It is a very excellent article to pattern after. The wrinkle shown in the sketch is a system used now in California which consists of blocks, moulded with and becoming part of the retort, to facilitate the setting and to make the shrinkage and settling as close to the minimum as possible, as the bolt holes at the mouthpiece are as far from the inside or gas-way as will permit. Outside of the mouthpiece are flanges held on by clamps in Fig. 3, obviating as much as possible the scraping or disintegrating into the bolt holes, giving substance where strength is required, as shown in the whole setting. Expansion bolts are used on the mouthpiece, as shown in Fig. 2, and described in the American Gas Light Journal, Aug. 30, 1897, page 331. Fig. 1 shows the whole setting of five retorts.

This is a very excellent thing to pattern after. The wrinkles shown constitute a system now used in California with success.

No. 4.—*Device for Cleaning the Scrubber;* by G. H. Hollidge. This is a wrinkle to clean the scrubber and to clean the spray, which cold water will not do. Superintendents often find the spray in the scrubber choked, and further often have to resort to the removal of the coke from the scrubber on account of heavy tar being there, which cold water spray fails to remove, causing back pressure, to say nothing of the gas not being properly cleansed. To remove this state of affairs and to scour your coke thoroughly and to remove all tar and filth, tap a ¾-inch hole in the shell above the tray, as shown in Fig. 1, screw a short piece of pipe to the center of your scrubber, attach cross nipples and elbows, as shown in Fig. 2, connect outside with your steam pipe and water pipe, and spray, as shown in Figs. 1 and 2. Inject steam into your spray when necessary which will clear it quickly; then turn on steam to the cross and thoroughly scour your coke, cutting out all tar and filth. Sometimes during the cleaning up steam and hot water running together from the boiler into the spray will cut the thick tar, but the steam from the bottom crosspiece will do the work. It is also a very convenient contrivance, in case of frost, to inject a dash of steam, however slight. Many works have no boiler for steam, but if a small one was purchased and used for these purposes it would quickly pay for itself.

Mr. Gregory—I might remark right here that in case you were getting a small boiler for the purpose of steam, you might pay for the boiler by using an exhauster at the same time.

No. 5.—*A Seamless, Non-Collapsible Diaphragm for Gas Meters;* by John Hearne, Brooklyn, N.Y.—The diaphragm herewith presented in model on close inspection will be seen to possess no seams, and a uniformity of leather, both clean and neat, entirely of one piece, devoid of seams, leaks or pores, and hence non-collapsible. The leather also is buffed, which holds the oil instead of running to the bottom of the meter as in grained leather. Having no seams it requires no shellac, graphite or black lead to fill up the pores or pinholes. If the diaphragms can be secured at a reasonable figure the plan will doubtless meet the approbation of the gas fraternity.

The President—Have you the price?

Mr. Hollidge—No, sir. It is seamless, I see. Having gone over the whole diaphragm, it is one of the best of its class that I have ever seen. Here is one of the old make that I brought with me to show the difference between the two.

A Member—Do you know how it was done?

Mr. Hollidge—No; but I know it is done.

A Member—Is it not made by stretching one part more than another?

Mr. Hollidge—I don't know. I presume it is made on some special mold for the purpose; that is, after it is cut from the hide. The old one is full of wrinkles and seams.

Mr. Clements—This diaphragm is a very good wrinkle for the Pacific Coast Gas Association. It has no dead end.

No. 6.—*Device for Cleansing Hydraulic Mains and Seal Pipes;* by G. H. Hollidge.—A close inspection of the sketch will show a method of cleaning heavy coal tar from the bottom of a hydraulic main and also for cleaning the pipes from the main to the seal. In the sketch *A* is the seal pipe, and *C* represents a 2-inch or 2½-inch pipe tapped into the bottom of the hydraulic main, fitted with a nipple on which is a tee, also a jet made of ¼ inch pipe connected to the tee as shown at *C*, Fig. 1, and *C*, in Fig. 2, and connected with the steam and water pipes *F* and *G* as shown in Fig. 1. In cleansing, open the cock *B* and turn on the steam from pipe *F*, Fig. 1, to keep clean the pipe leading into the seal. Also steam from pipe *H*, Fig. 1. Alternate with water as the tar thins out. Cold water will not drive out heavy tar; hot water and steam will be the best. After all cleansing is done, close off all steam and water, open valve *E*, Fig. 1 and Fig. 2, as shown, place in oil, which will lubricate the core of the cock *B*. It entirely dispenses with the removal of the core for lubricating, thereby avoiding all mess of tar in the retort house. The work is quickly and cleanly done.

No. 7.—*Device for Preventing the Tearing of Gas Bags in Tapped Mains;* by John Hearne.—The wrinkle is from Messrs. Wm. Crane & Co., 838 Broadway, N. Y., mailed to me by Mr. John Hearne of 130 Atlantic avenue, Brooklyn, N. Y. It is a very neat device for preserving the life of gas bags which so often get torn from jagged end threads in newly tapped holes. This idea will obviate many troubles connected with working on live mains, and is valuable in saving gas and preventing accidents from torn bags. The device may be new and interesting to many of the members.

Mr. Hollidge—The bag does not come in contact with the thread. I should think it was a very good wrinkle, particularly on large mains, and especially in instances where bladders are used, and not bags, for they are tenderer.

No. 8.—*A Valve or Drip Cover;* by "G. H. H."—This valve cover, as herewith sketched, can be made of cast iron. The cover is strong and durable, and the lid to the cover cannot get out of place. When once placed in position and turned to the right or left it tightly jams itself and cannot be moved except by placing a sharp instrument or pick in the slot, as shown, in the cover, so as to move it from side to center, to take it out of the slot, as shown in the top of box in Figs. 1 and 2. It can be extended any desired length by placing it into a piece of 6-inch pipe, as shown in Fig. 1, by placing a piece of 4 inch pipe inside, as shown in Fig. 2. In using pipe for extension purposes, yarn and calk the joints with lead the same as in laying mains.

No. 9.—*Gas Bags for Leaky Center Seals or for Keeping Inlet and Outlet Pipes Clean in Purifiers not in Use;* by G. H. Hollidge.—This wrinkle, as shown, is a gas bag attached to ¼-inch pipe, for placing in the inlet and outlet of purifiers when open, to prevent leaks from center seals, or to exclude dirt that may find its way into these pipes, provided lime or other purifying material is used that needs removal. *A*, Fig. 1, represents the bag in use which will have to be removed from the pipe before the tray can be put in place; *B*, Fig. 1, would also have to be removed before the lid can be put down. This entirely obviates the necessity of removing the lid when once in place, which many have had to remove after the gas has been turned on finding that the plug has been forgotten in either inlet or outlet pipes. It will also be noticed that the pet-cock or valve resting on the top of the purifier box can be inserted, blown up or removed from the floor of the purifying house without getting into the purifiers.

No. 10.—*Device for Cleaning Condensers and Regulating the Temperature of the Water therein during Winter;* by G. H. Hollidge.—This device is for cleaning the condenser and to regulate the temperature of the water during winter. At the base of the tubes in a condenser will form a sediment of filth and rust, and sometimes a tar, which, if allowed to remain, forms itself into a hard, immovable substance, except the passage made by the water connections. Also, gas passing through a condenser in cold weather, if allowed to chill suddenly, will cause naphthaline stoppages at the tees, elbows or bends. By the use of the connection proposed, a small jet of steam will remove that chill, by simply turning on the steam into the water pipe; the water, steam and outlet and overflow pipes all being in one, leading into the condenser and seal, as shown in the sketch, Figs. 1 and 2. By opening cock *A* the deposit can be let out and down into the seal, a small jet of steam will loosen it up inside and the water will drive it out. The connection is

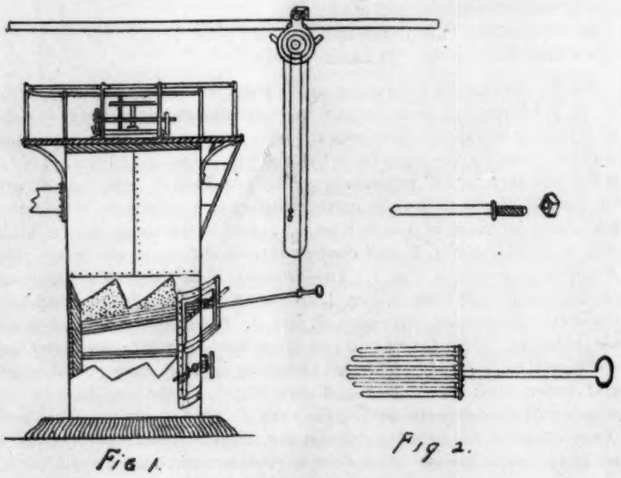
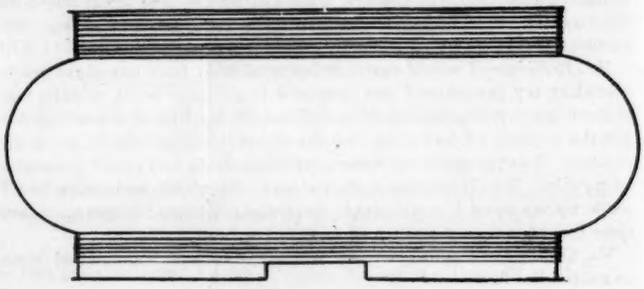


Fig 1. Fig 2.

Wrinkle No. 2.



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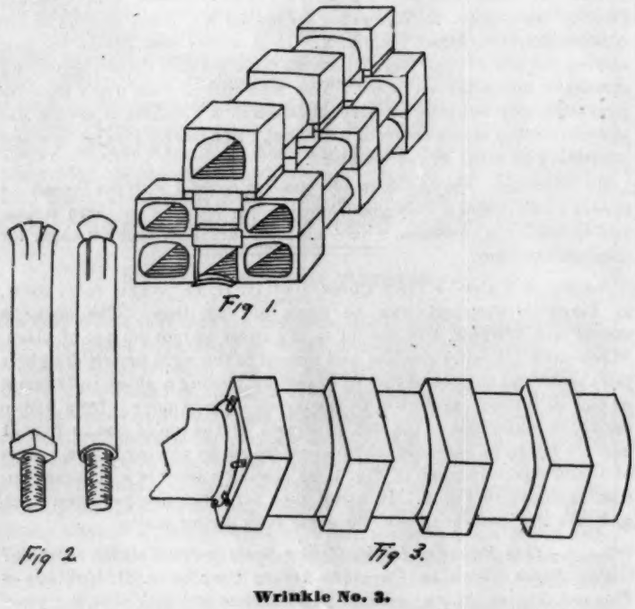
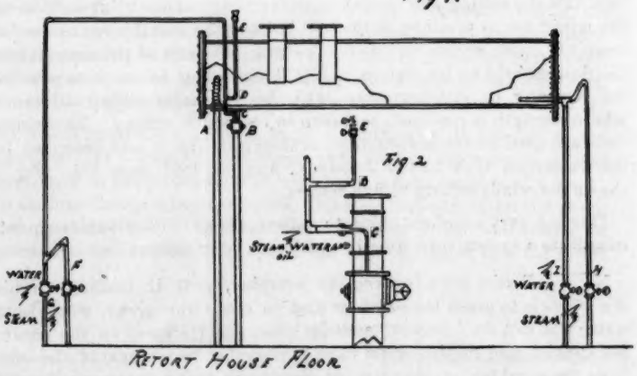


Fig 2 Fig 1. Fig 3.

Wrinkle No. 3.



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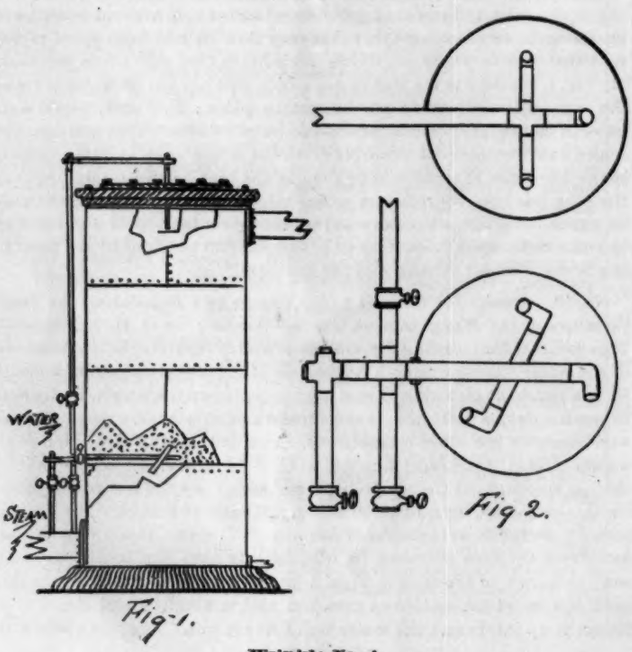
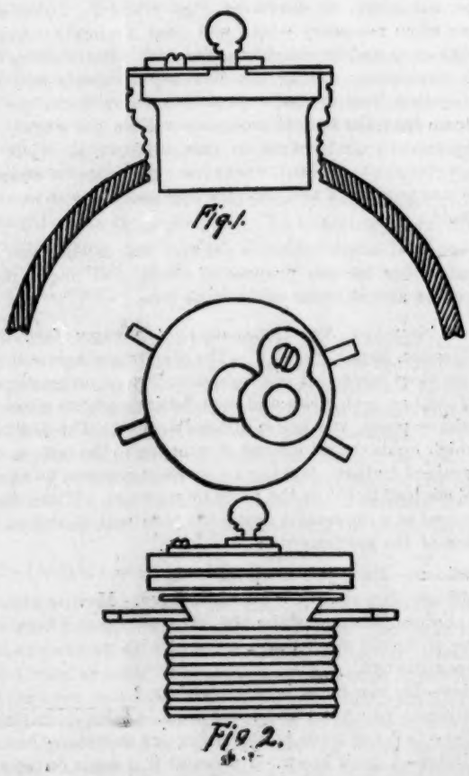


Fig 1. Fig 2.

Wrinkle No. 4.



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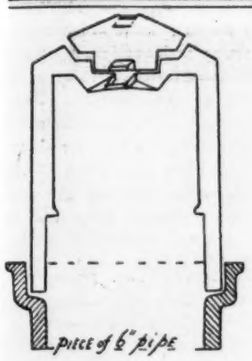


Fig 1.

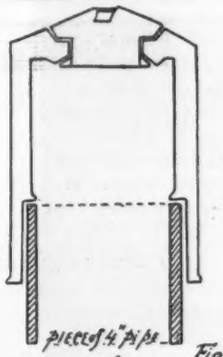


Fig 2.

Top of Box.

Box Cover

Wrinkle No. 8.

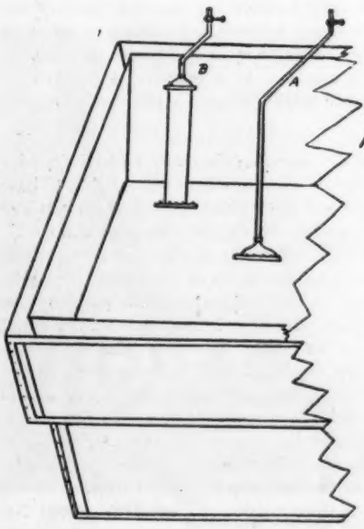
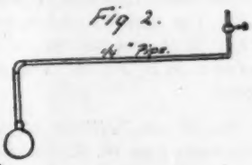


Fig 1.



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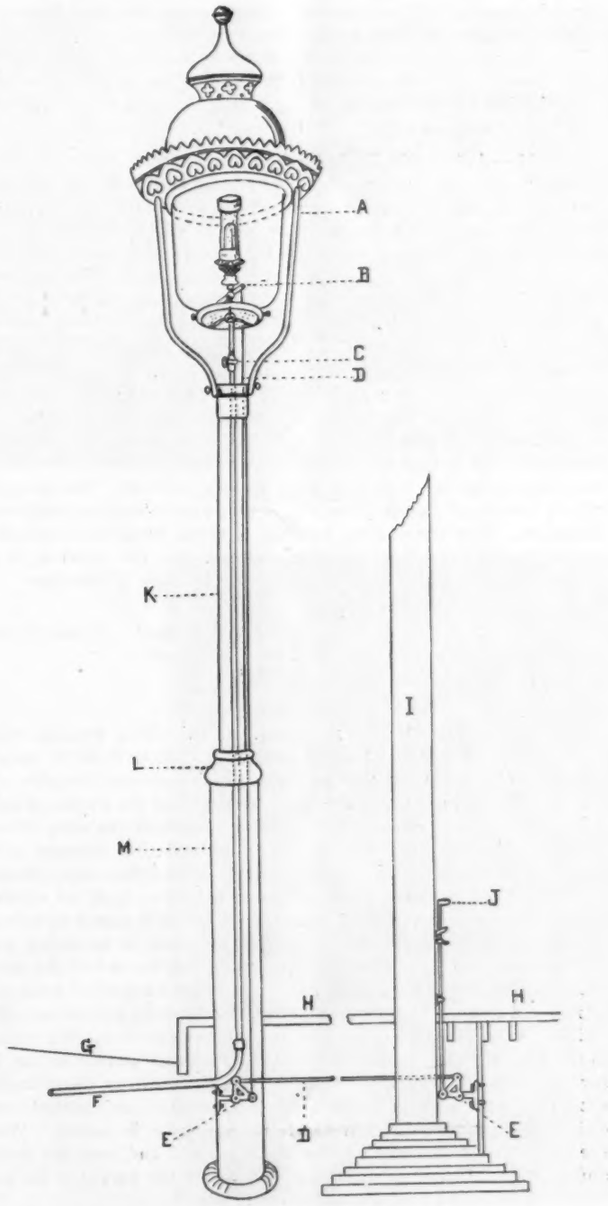

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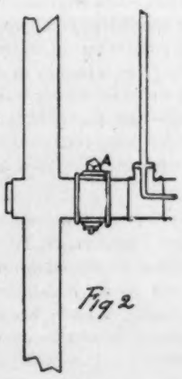
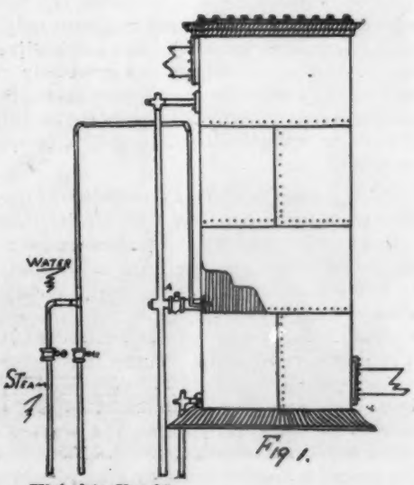
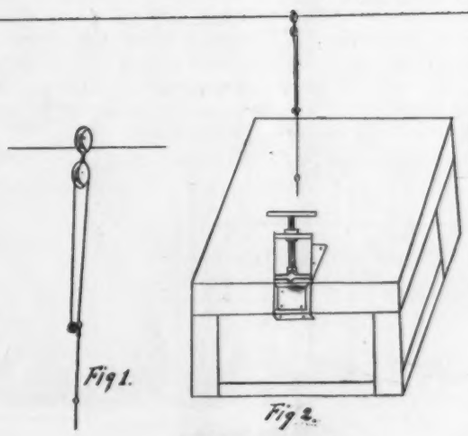


Fig 2



Wrinkle No. 10.



Wrinkle No. 12.

made by tapping a 2-inch hole in the shell above the base line of the tubes, three short nipples, cock, 2-inch by ½-inch tee, and a ½-inch or ½-inch connection inside the tee, as shown in the sketch. If the threads at the base of the tubes are rusting through by the action of the water, an injection of hot oil tar, through plug *C*, into the condenser when dry will be very beneficial.

No. 11.—*Automatic Lighting for Street and Store Welsbach Lamps;* by W. M. Parker.—We are indebted to Mr. W. M. Parker, of Bellingham Bay, Wash., for a plan of an automatic lighting attachment for street or store lamps. The city in which the gas works is situated is now operating the device here shown with good success, the entire street lighting and extinguishing being done from the main office, Welsbach lamps being used. The attachment, as shown in the cut, is herewith explained: *A* is a boulevard lamp; *B*, by-pass; *C*, cock; *D*, No. 8 wire rod; *E E*, bellhanger hinges; *F*, service; *G*, street; *H H*, sidewalk and floor; *I*, building line; *J*, transom rod pull; *K*, 3 inch standard pipe; *L*, 3 inch by 4-inch reducer; *M*, 4-inch standard pipe. The matchless by-pass is used with central spark inside the mantel, and the attachment is worked the same as is the ordinary transom by the aid of the rod and catch. A like attachment is used to light any outside light or Welsbach lamp in store windows. The lamppost, which is made of pipe at the works, is very neat indeed and well worth imitation. This idea of store lighting is much preferable to climbing in the windows and lighting with matches, and the interests of gas companies would be promoted through the adoption of the same.

Mr. Clements—How is it lighted?

Mr. Hollidge—By the American by-pass method. It may be done with a push button, and the whole street is lighted.

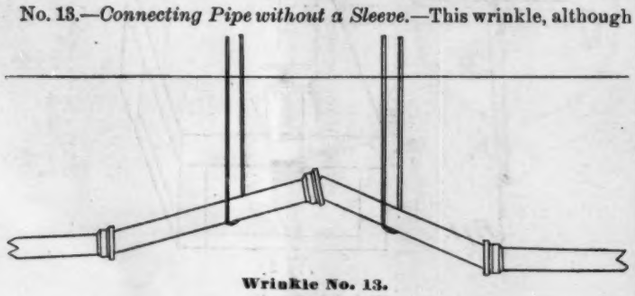
Mr. Gregory—It is an electric lighter?

Mr. Hollidge—Yes.

No. 12.—*A Pipe Marker;* by "G. H. H."—This wrinkle, which shows a pipe marker that travels across the shop in front of the pipe vise, is intended for marking pipe or any article around the pipe vise, and it will travel anywhere the width or length of the shop as desired. It consists of a wire stretched the width or length of the shop directly over the pipe vise, and two small blocks are used; one to travel on the wire and one to raise or lower the string. The string is put through the lower block, and on one end is placed a ball of lead, on which is soldered a small ring. The other end of the string is passed up through the block and down through the ring, and a knot in the string stops the ball from weighing down the other end. On the end of the string which passes through the block and ring is placed a piece of brass wire or red lead pencil. This pencil or wire is for marking pipe or any other article. It will sometimes save cutting a pipe twice through a mistake in finding a wrong mark, which is rarely found out till on the job several blocks away, and often saves one's clothes from being daubed with red or white lead, by hunting for a pencil in one's pocket, especially during a rush in stove season when time is money. When needed just take hold of the marker, pull it down and mark the article and let it go. It will go back into its place by the weight of the ball. Give this wrinkle a trial, for it is very simple.

Mr. Gregory—I would like to say about this wrinkle, that it may seem practically to deal with a small matter, but I adopted it after I had piped a store building, and laid on a supply to three or four stoves. I found I had made a mistake in the length of my lines of pipe. After I had laid out all the work, cut it, put it on the dray and got it on the job, I found I was out in three or four cuts. The way I found the difficulty was in the knowledge that I had used the wrong mark of a black lead pencil on the pipe. This mistake caused me several hours' annoyance and trouble in patching out and piecing new work, which I did not like, and the result was that I adopted this little scheme of a wire stretched across the front of the shop, with a red lead line marked on it. Since then I have not been in like trouble.

No. 13.—*Connecting Pipe without a Sleeve.*—This wrinkle, although



Wrinkle No. 13.

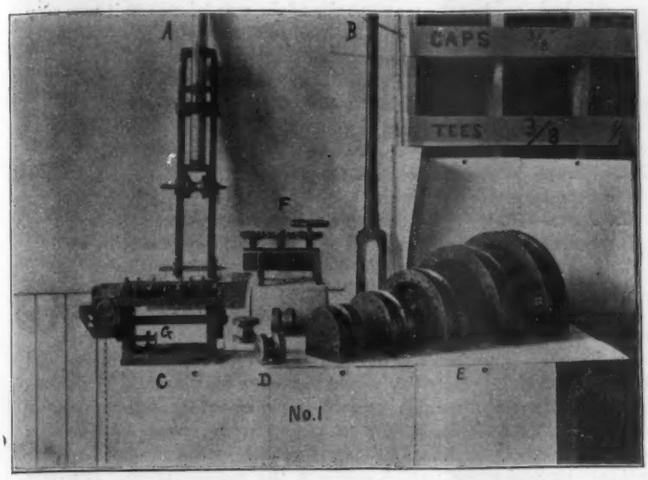
comparatively old, is not out of date by any means. In pipe laying, in connecting ends, obviating the necessity of using a sleeve is a matter of importance, as a bell end is much preferable over a sleeve, for various reasons. In using this plan (see plate No. 13), to be as nearly accurate as possible, when within a few lengths of connecting the pipe, measure from the inside of the bell to the inside of the bell, down in the ditch, and lay the pipe along on the top of the ditch, cut according to the measure below. This will entirely dispense with handling the pipe twice, and in and out of the trench, and the pipe will drop into its place. The wrinkle is an excellent one, but not universally adopted.

No. 14.—*Bending Machine for All Sizes of Pipe, from One-Quarter Inch to One Inch;* by W. M. Parker.—This wrinkle is from Mr. W. M. Parker, of Bellingham Bay, Wash., and by its development he has invented an inexpensive bending machine, the value of which when placed in a shop cannot be overestimated. The illustrations accompanying the wrinkle show its method of operation, etc., with great clearness. Fig. 1 shows the machine attached and dislocated, in which *A* is the main lever; *C*, fitting table for holding the machine upright on either side; *D*, grooved sheaves or rollers; *E*, the disks or curved forms over which the pipe is bent—the holes shown in the outer edge of the former are used for inserting a pin for the lever to stop against while making a bend or duplicating the same; *F*, hinge vise, right or left; *B*, releasing pin for fitting table. Fig. 2 shows the machine mounted upright in the act of bending. The machine is adjustable for from ¼-inch to 1 inch pipe, black or galvanized. The space occupied on the bench is 5 inches by 7 inches, and the weight 150 pounds. This machine is especially adapted for making bends of any angle or description of coils, without flattening, buckling or splitting. The photographs will show and illustrate what work can be done. If Mr. Parker could furnish this machine at a reasonable price many would doubtless have it in their works, as much expense would be saved by its use.

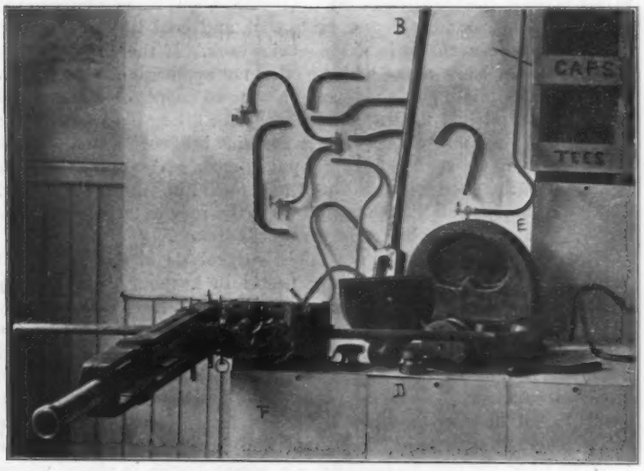
No. 15.—*Tightening a Door Frame when the Bolt has Stripped.*—This wrinkle is furnished by one of our members who prefers to have no name mentioned, but in virtue of the wrinkle having been put successfully into actual practice under difficulties speaks much for the idea. Wrinkles that have been adopted in emergencies successfully are tantamount to the reduction to a minimum of labor and anxiety for the next member who getting in a like position can pattern after others with confidence; therefore, the first inventor deserves much credit, though modest in having his name withheld. The eye-bolt in the fire door frame that holds the steel shield that drops down to protect the face joint in the door frame from the scoop while firing became loose and in attempting to screw it the threads of the bolt in the door frame were stripped. In that the metal was only a few degrees from red hot made the work much harder. To accomplish the tightening up of the frame the threaded part of the bolt was cut lengthwise, as shown at *A*, Fig. 2, and a wedge, made from a piece of steel strap, about No. 12, B.W.G. was inserted, when a blow from a hammer did the work, as seen in *B*, Fig. 2. The wrinkle proved a success and still holds good.

No. 16.—*A Drill for all Sizes of Holes, from 3 Inches to 6 Inches Diameter;* by W. M. Parker.—Wrinkle No. 16 is furnished by W. M. Parker, of Bellingham Bay, Wash. Mr. Parker does not claim originality for it entirely, but it was improved by him for the special purpose for which he uses it. The illustration shows only two cutters on the outer edge, but the drill has four cutters and is adjustable from 3 inches to 6 inches. The center drill acts as a guide only. The wrinkle, which was used by Mr. Parker for the purpose of drilling into the purifiers for using steam revivifiers, and to lessen the liability of cracking the bottom of the box while drilling it, proved a complete success. The idea is excellent.

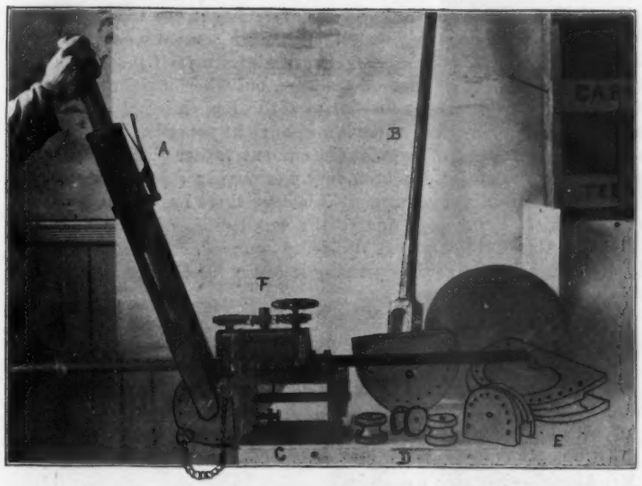
No. 17.—*Device for the Preservation of Gas Pipes from Corrosion through Mineral, Salt, etc., and Electric Currents;* by "G. H. H."—This wrinkle is a device for preventing gas pipes from being eaten up in mineral or salt ground, and is intended to act as an insulator against electric currents. Of late years gas companies have been troubled a great deal through service pipes being eaten up and becoming leaky, thus causing expense in tearing up streets to find the source of annoyance. In many instances it has proved that pipes coming in contact with the electric currents for street railways have been a continual trouble and expense in the loss of gas, and the cost of labor and material in repairing damages. The adoption of the trough and pitch system will cure the difficulty. The sketch shows a top and side hole. The trough is made of 1 inch by 4 inch dry lumber. After the service



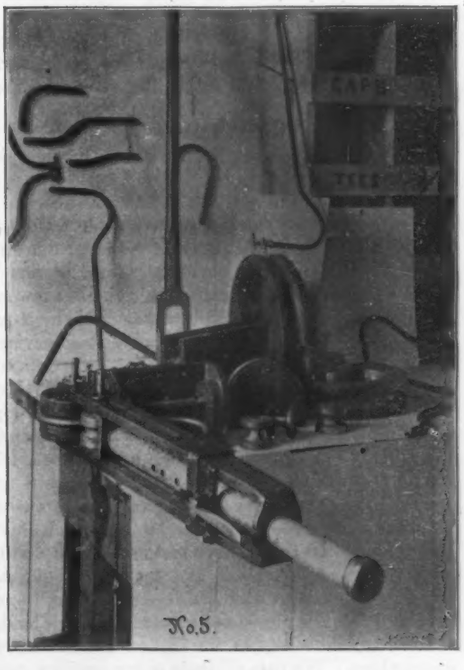
Wrinkle No. 14.—Fig. 1.



Wrinkle No. 14.—Fig. 4.



Wrinkle No. 14.—Fig. 2.



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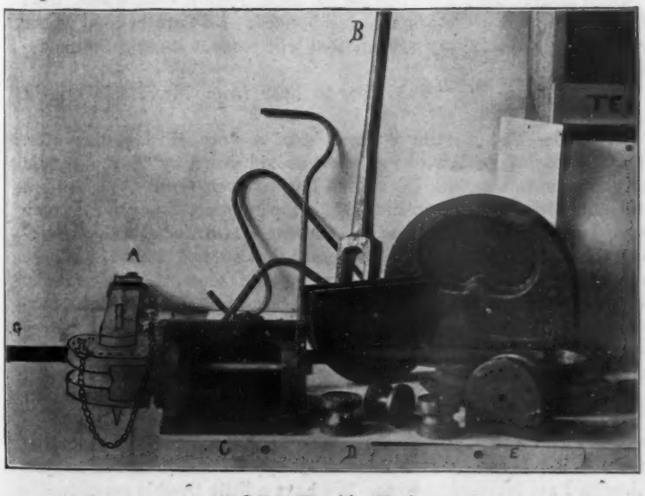

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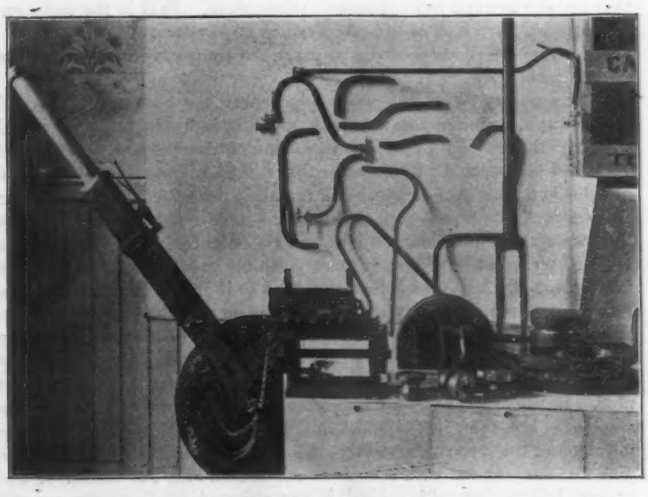


Wrinkle No. 14.—Fig. 6.

is laid place in the trough and lay the service about 2 inches above the bottom, fill in around with dirt, tamp well, and coal tar the pipe and trough inside from the main to the service cock. If the pipes have already been dipped in a tar bath no other tar application is necessary. To prepare the pitch, place the tar in a covered copper or caldron and boil until the pitch is made. When ready for filling the trough place a stick in the tar and quickly insert the stick into cold water. If the pitch breaks on the stick or is brittle put in more coal tar, try the stick again and if the pitch will bend back and forth like rubber it is ready. Put it on the pipe and fill the trough up to the service cock in the sidewalk. Wait until cold before filling up the trench.

Mr. Gregory—That would not affect electrolysis of the mains. It refers to services. It might be very useful in keeping the electricity from running from a road to the main, but it would not keep electricity from getting into the main from the crosses, and running down the main until it struck a damp place, where in leaving the main it would cut a hole in it as it goes. I would like to ask, though, if there is much trouble from electrolysis where we have the overhead wire, trolley system. In San Jose we have had no trouble from electrolysis. I have examined our pipes two or three times and just before coming to the meeting I had the men go right by the power house, in places where one might suspect there would be trouble, and test all the joints to locate any trouble from electrolysis, and they found none. It is true the Water Company's pipe runs alongside of oure, and electricity is fonder of water than it is of gas. Still I would like to ask if there is electrolysis in places where the overhead trolley system is used.

Mr. Steinmann—In Sacramento the other day, at the corner of 3d and O streets, a pipe was found that had been so eaten as to cause it to look like a sieve.

Mr. Gregory—Have you the trolley system?

Mr. Steinmann—Yes; the street car turns right around the corner on the trolley system.

The Secretary—In Alameda (one of the districts we supply), we have had in the last four months more trouble with electrolytic action on our pipes than in all the previous years. Immediately in front of the power house, situated in the marshy land between Alameda and Oakland, we have had to take up within the last few months about 300 feet of 2-inch wrought iron pipe that was used as a temporary main, and have had to replace on several occasions services. On the last time one of the services gave out inside of six weeks after being put in. I could not get the railroad company to do anything towards bonding the rails, which they should have done. So I adopted the expedient of connecting a copper wire soldered to our service pipe on both sides of the rail. I don't know whether it has ever been tried before, but where the service pipe ran from the temporary main underneath the track (which in each case was the service pipe eaten out) I soldered to the fishplate a No. 4 copper wire and soldered that also to our pipe on either side. Since that time I have had no difficulty with those services nor with the temporary main. It may occur, but that is the only place where we have been affected, despite all our immense system of railways. I think we have more miles of electric trolley roads in Oakland than in any other city in the United States. They parallel our pipes everywhere. We pass all their power stations, and this is the only instance where we have had trouble; but the bond wires between the fishplates seem there to be eaten out through some chemical action of that marshy ground more than any other place. That is the only experience we have had with electrolysis in our system.

Mr. Gregory—Your idea was to make the complete circuit from one side to the other?

The Secretary—Just make the pipe carry the current, if it would carry it at all, underneath the track, meeting it on the other side and then taking care of it on the next section. I don't know that it ever was tried before, and I don't know that it ever will be successful as a possible complete prevention, but it certainly has effected the end so far as protecting the pipe is concerned against the very short time in which they were eaten out before. I have two or three pipes in my office which I meant to have brought over with me as samples of the trouble that occurred. The pipe is honeycombed as if it had been burned in a fire. I have seen electrolytic action before on pipe, but never such as this; and the peculiar part of it was that a small leak was reported by one of the car motormen. We dug up the pipe and discovered a very small leak, that we thought was simply a blowhole, or a pinhole in the pipe. In uncovering the ditch further we detected a small leak. The workmen, however, in stripping off a layer of adobe that covered the pipe, found the pipe eaten underneath. It was a singular thing. The pipe was surrounded with a layer of adobe soil, and the action of the current had penetrated it. Until it was stripped off there was no appreciable leakage, but the moment the adobe was taken off it was seen there were holes in the pipe ¾ of an inch in diameter.

Mr. Jones—Was the pipe negative or positive to the rail?

Mr. Britton—It varies. The road changes the direction of its current. Sometimes it is made positive, at other times negative.

Mr. Jones—It occurs to me if you were providing a conductor to your pipe the dangerous spot would be where that current leaves your pipe. There is where electrolysis takes place.

The Secretary—That is right.

Mr. Jones—Where the action on the iron takes place.

The Secretary—I have likened it to a mule with shoes kicking against a pipe continually. It is the action of the current in getting away.

Mr. Jones—Is that near the station?

The Secretary—Within 200 feet of the power station of the Alameda line.

Mr. Gregory—I understood the Secretary to say that he made a short circuit and that the electricity would not leave his pipe. If he made a short circuit to the other side it would simply travel through the copper wire, through the service at the bottom and up the copper wire again; but there would be no leaving there, if you allow the current to enter another pipe and travel until it comes to the marshy place. It would no doubt eat up all the pipe in the marshy place. We are fortunate in having no marshy spots in San Jose. I did, however, really ask to find out if we were protected by an overhead wire, and it seems we are not.

Mr. Steinmann—You said a little while ago that in San Jose the electricity gave preference to the water pipe. I do not find it so in Sacramento. They give us the worst of it there.

The President—Mr. Copley, can you give us any experience?

Mr. Copley—This trouble exists in every city in the country where the return electric current from the street car company goes through the ground. For a few months I congratulated myself that I was not having the same trouble that others were, but when it did manifest itself it was very severe. As I understand this topic it is not a mechanical but a chemical matter; there is a change in potential. The action is similar to the action of a galvanic current rather than a dynamic current, and the subject has been very thoroughly discussed in every Gas Association in this country. I believe there has been a law suit on the subject brought in one of the small cities of New York, in which the Gas Company was decidedly worsted. Unless I am decidedly mistaken, a law suit is pending in one of the cities on this Coast; is there not, Mr. Secretary?

The Secretary—At Spokane Falls, Wash.

Mr. Copley—How far are you along with that, Mr. Aldrich?

Mr. Aldrich—It will be tried the first week in September.

Mr. Copley—Then you have undoubtedly prepared your side of the case?

Mr. Aldrich—We have the finest expert evidence in the country.

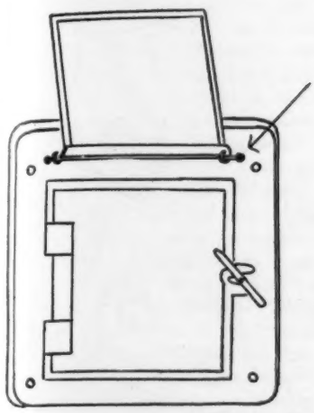
Mr. Copley—Your experts do not regard it as mechanical?

Mr. Aldrich—No, sir; dynamical.

Mr. Copley—Entirely. At present I have heard of no way whatever of avoiding this save by using the double trolley, which will avoid it, or by bonding the rails perfectly, which seems to be impossible. By good bonding of the rails the trouble could be very much reduced. Our electric road in Aurora, Ills., was remarkably well constructed, and two or three years elapsed before it dawned upon us we were being troubled there. Now I am having the same trouble, even worse, than others, where the rails are not well bonded. I do not believe at the present time there is any system that will prevent it other than a return wire.

The President—We would like to hear from Mr. Poole on the current.

Mr. Poole—The electric current is of a very elusive character. Through the natural law of resistance as laid down by Ohm, a person can calculate to a certain degree the flow of a current. As a general rule on trolley roads the positive side is the dynamo. They do, in some cases, I believe, reverse it, and the current is returned almost universally through the bonded rails, and some that are not bonded. Where they have good gas mains and the water pipe is close, they do not take the trouble of bonding the rails in many cases, but the law of the current is to follow the path of least resistance, then the current passes down through the trolley into the motor to the car wheels into the rails. Then it goes promiscuously the shortest cut to the station to get hold of the dynamo. It might leave the rail at one point to travel on a pipe for 10 feet or 100 feet, and then skip off to another pipe—whichever, as I said before, gives better contact and the path has least resistance for it. I have never made any special study of the subject although I am inclined to do so. We have a little trouble occasionally



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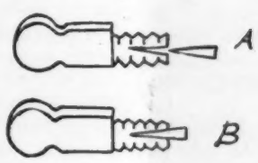

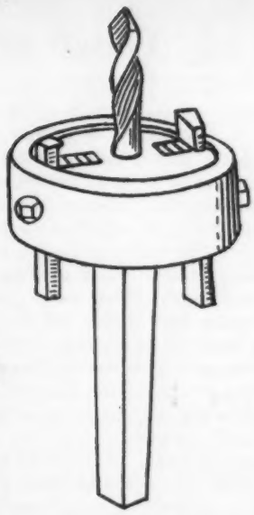

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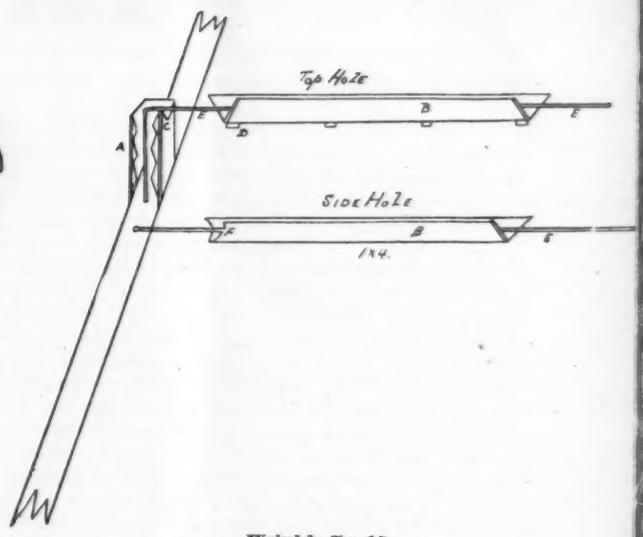

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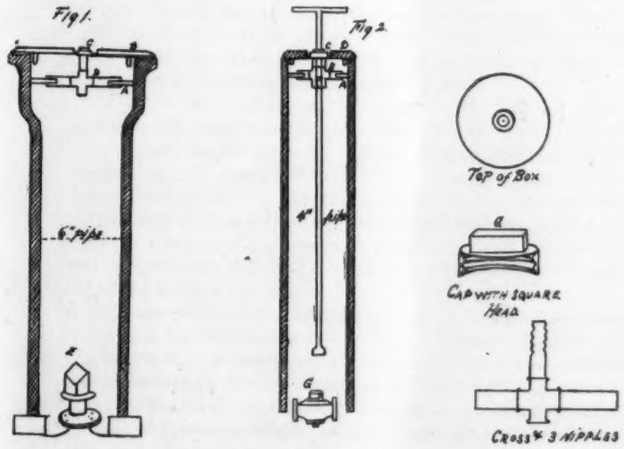

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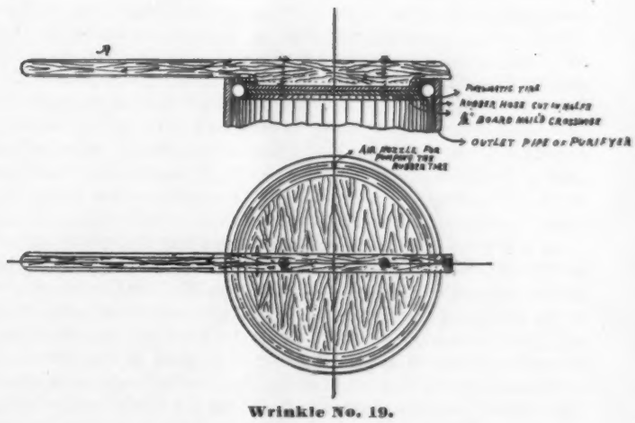

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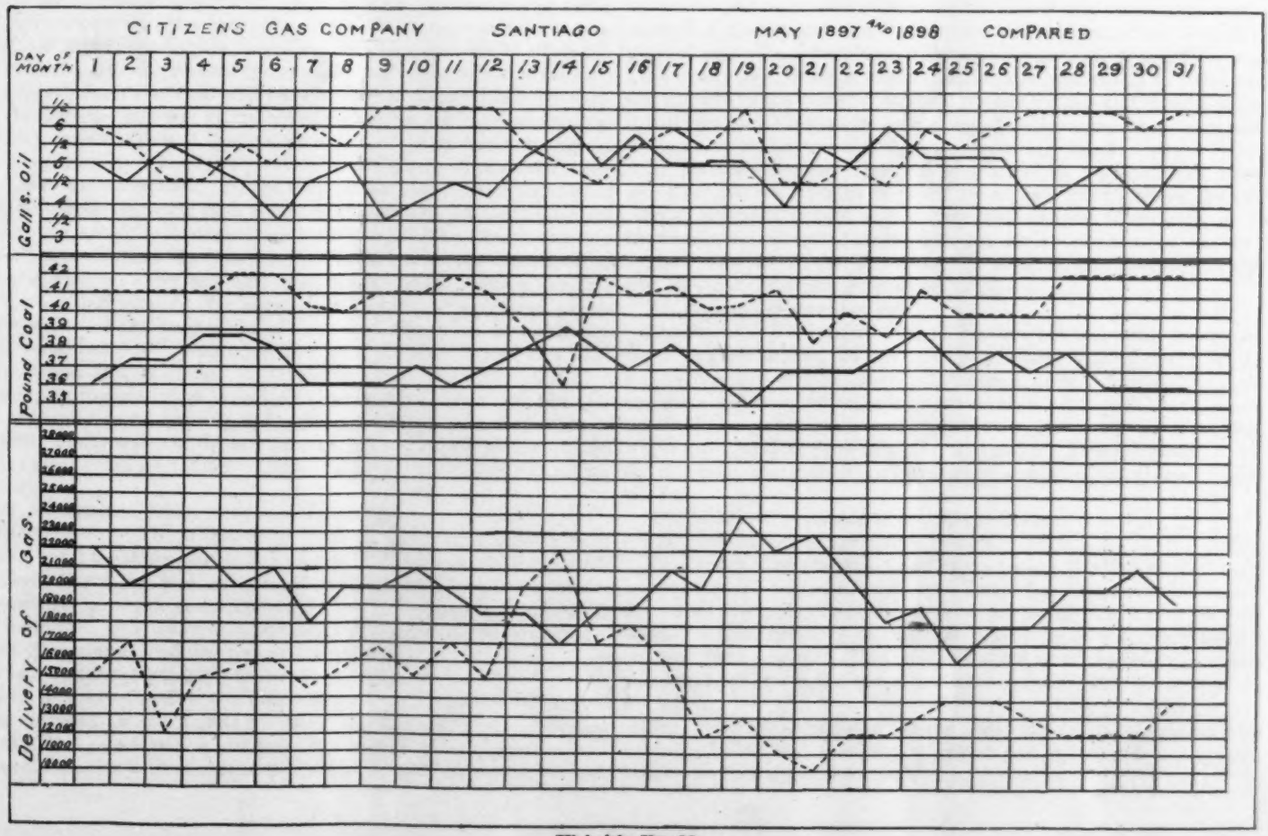

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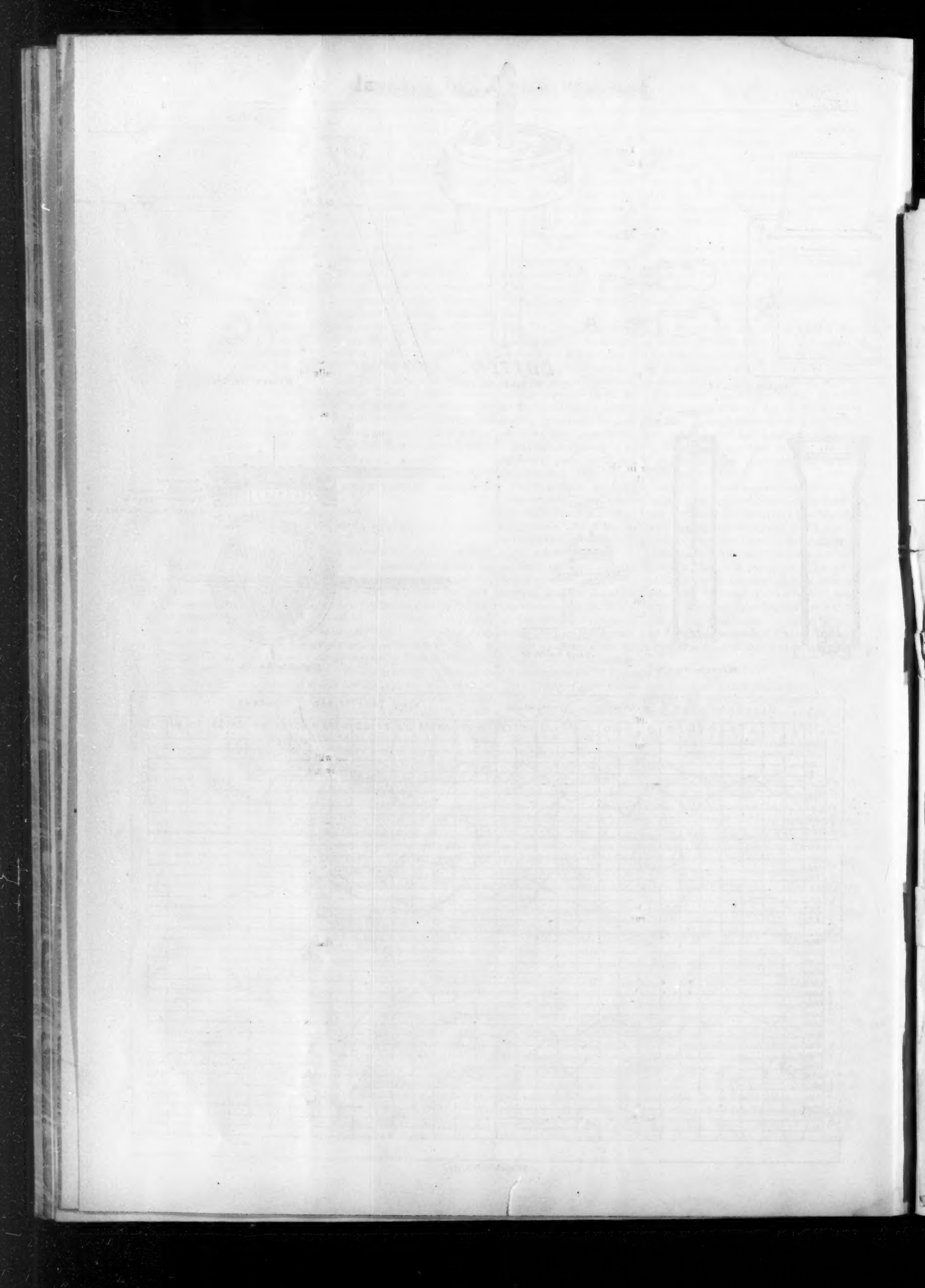
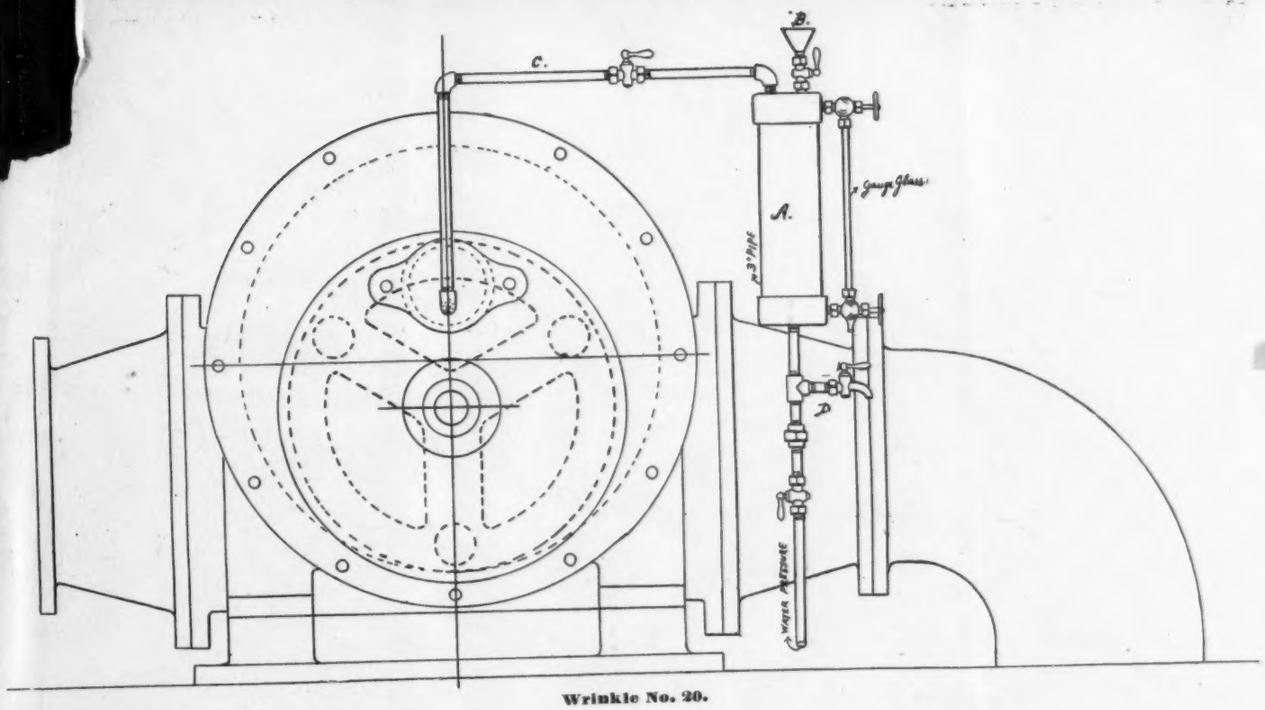




Wrinkle No. 20.

Fig 1.

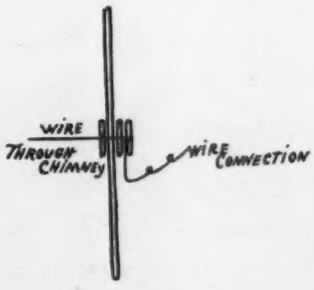


Fig 2.

Wrinkle No. 21.

Fig 1

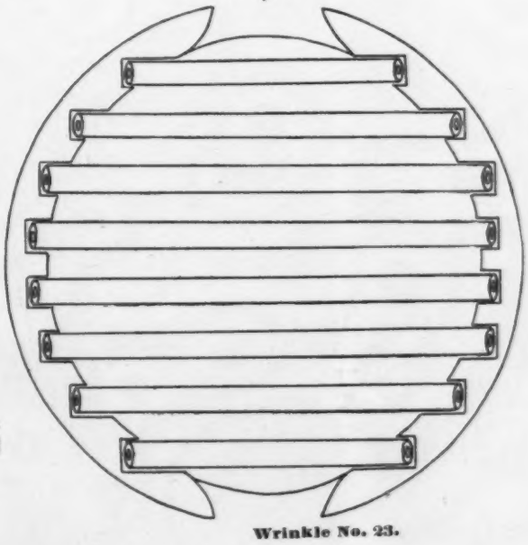
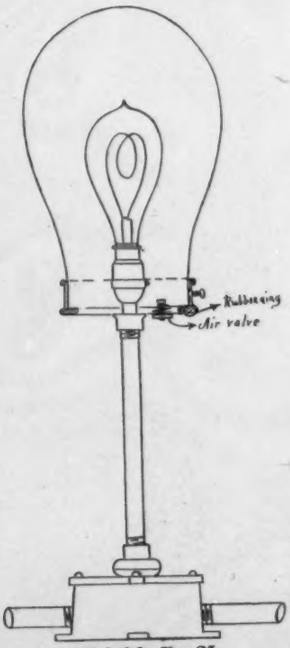


Fig 2

Wrinkle No. 23.



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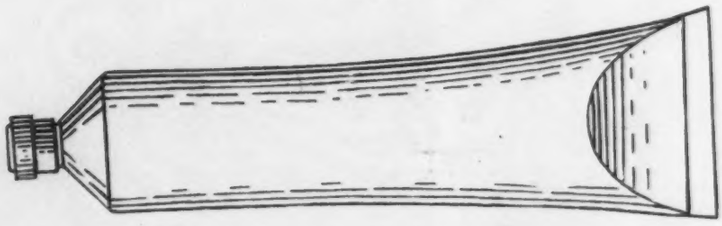

Wrinkle No. 24.

round the city, and Mr. Smith and myself have traced one particular case very nearly to a point where we believe the ground action is responsible for a great deal of the trouble. You take a swampy character of country, or in our city where have much made ground, that will become permeated with all kinds of gases, which is really an earth battery in itself, and I have no doubt that you can stick a piece of copper down 20 feet or 30 feet in such ground and get a difference of potential of two or three volts on the instant, which at any time would cause electrolytic action. The principal trouble, however, comes from where the trolley roads use excessively high currents, and the effect always occurs at the point of leaving the pipe. It is purely electrolytic action, and, no matter what the sort of pipe, or the nature of the earth through which the current passes, you cannot lay down any hard and fast law as to where, when or how the current is going to get home. The main thing we know is that it gets there.

The President—On Pacific and Sacramento streets, and all those sections as well of San Francisco, which at one time were parts of the Bay, my experience is that the gas services last a very short time, and have all the appearance of having been destroyed by electrolysis. There certainly could be no suspicion that electricity was the cause of the destruction, for I speak of a time before an electric road was in operation there; in fact, I believe none are there yet. In those filled in sections I found from experience that service pipes rarely ever lasted over three or four years at the very most. This goes to corroborate what Mr. Poole said that swampy, filled-in ground has many of the contained gases sufficient to electrolyze iron mains.

Mr. Cardiff—I have had some experience in this line. I had a service pipe running underneath the railroad that was eaten through by electrolysis, and in order to cure it I put a copper wire on each rail, dug a ditch in the damp ground, put in a large copper wire and grounded it well so that my pipe would not carry the electric current. The current will always follow the best ground, and as copper is a good conductor, if you put in a copper wire in moist ground wherever it is near the gas pipe, you will find the current will follow the wire and the earth, leaving the gas pipe alone.

The Secretary—One of the companies over in Oakland has found a partial solution for the leaking of the current through defective bonding, and that is by electrically welding the rails. They have electrically welded somewhere in the neighborhood of 10 miles of single track. A proportion of the track runs through swampy and made ground, where there would be greater possibility of trouble, but we have had no trouble whatever in that section. On high and dry ground, going out towards Berkley, where the soil is rocky and of heavy adobe, there is no leakage of the current to any extent. We made exhaustive tests all along the lines about two years ago. Once in a while we would have evidences of static electricity in the soil, but nothing that would affect our pipes, and I am satisfied that the cheapest and most effective solution of the problem is electrical welding of the rails. In a climate like ours, where there are no great variations in the temperature and sudden expansion from the heat, it does not affect them. I understand that in St. Louis they have bonded the rails almost entirely of the trolley line and have had no trouble. In this State, if we could effect legislation that would require some such action on the part of the railroad companies, we would be benefited unquestionably. The time is coming when the gas man will have to protect himself, if the water man doesn't, because we don't know and none of us can tell what damage is going on until it shows itself. We have all had, probably, the same experience with that adobe covering. I have had pipes that, though eaten out, would not show a leak until they were uncovered, and then they were found full of holes. I remember once where the root of a eucalyptus tree got into a 1½ inch service, running about 300 feet. It got through a small opening and grew in the pipe the whole length of it, until finally a stop of the service was reported. Talk of the virtues of gas and carbon monoxide! There is a direct evidence of life-giving quality.

Mr. Steinmann—Did it go toward the station?

The Secretary—No; it got away from the station as rapidly as it could, but it broke the pipe at two sockets in that length, and the earth and soil around the pipe stopped all the leakages. That may be the case with some of our main pipes. We won't discover the break until the earth falls away or until it becomes nothing but an earthen pipe.

Mr. Steinmann—Did that tree bear any fruit?

The Secretary—Nothing but electric currents.

Mr. Gregory—I noticed two different methods suggested. The gentleman from Oakland is quite generous. He finds a short circuit and takes it back, not allowing any leak for the electric company; the gentleman from Santa Cruz chucks it down in the ground and lets the leak go on. I am in favor of the plan proposed by the gentleman from Santa Cruz.

Mr. Cardiff—The Secretary stated they bonded the rails and carried it right around. I do not believe in that, because I think that the current running on those rails is bound to jump off. It is not grounded in a good many places, and I think the gas men ought to have it grounded wherever their pipes are near it. When wet weather comes, the electric current is bound to follow the pipes.

Mr. Poole—I think the proper welding of the rails will do much toward relieving the difficulty, but I think it will eventually come to this. I believe that a proper bonding of the rails, and then at frequent intervals connecting return feeders to the rails, in that way to reduce the resistance on the home path, is the only way it will be overcome. The subject of double trolleys has been discussed until it is worn out, and I do not think it will ever be made practical. By properly welding the rails together to reduce the resistance at the joint a fairly good path is made, but at the same time, taking several miles of those iron rails, each has a resistance six or seven times the resistance of the same cross section of copper, and the tendency still would be to go off and take the pipes. By connecting two rails with good, large sized feeders, and putting them on poles and running them back to the station, I think much will be done towards gaining security.

Mr. Hollidge—Whilst it seems prevalent among our members to look to the other fellows to do the work, what are we going to do between now and the time that they get ready to move, as large bodies move slowly? What are we going to do with our pipes while the electric companies are getting ready to do this work? We are losing gas. The course to pursue is to get at it as quick as possible and stop it. If we wait for them to do this for us we will wait a long time I think. I have laid services now for a number of years, and in our mineral soil I often find a spot where it eats out a 2-inch pipe in a year. I always find that the small companies, if I have to say so, are managed by men always looking out to reduce all these little expenses to make up as big a list at the end of the month as they possibly can, as they don't want to be on the losing side and continue spending money for pipes, services, labor, etc. I made up my mind that I was going to remedy this electrolytic action and I did so. I adopted the system described in the wrinkle. I dug down the other day to see how it was going on, and it was just as snug as the day it was put in. This trough and pitch system to my knowledge has been in vogue for at least 30 years in certain places where the mains or services had to be protected from the attacks of gases exuding from made lands. I uncovered pipes so treated after being in the ground 20 years, and, knocking the pitch off the pipe, the latter was just as sound and solid as the day it was put in, without a particle of rust or any sign to show that rot had harmed it. And if a piece of pipe runs through a strip of marshy ground, in order to prevent electrolysis, or other electric action, the best way is to keep our end up, letting the other fellow keep his end up bye and bye, because it will be a long time before he will act. We, however, have to act and look out for ourselves while they are thinking about it.

Mr. Parker—In what manner does electrolysis appear? Is it more prevalent in cast than in wrought iron. Is it manifested in general pitting, or does it seem to seek out the weaker spots of the iron; or is the iron surrounding the place where the cut is made of a foul nature?

The President—In San Francisco a piece of 2-inch pipe was cut out just like that (illustrating diameter) in places.

Mr. Parker—Wrought or cast?

The President—Wrought. We find it does but very little damage in cast iron pipes so far. In wrought iron 2-inch pipe, a hole ⅛ or 1½ inches long will be made, then will follow a stretch of sound iron, and again we will encounter a hole not more than ⅛ or ¼-inch long, and so on until the puncture is a mere pit hole; but it travels along the whole pipe, jumping from one place to another. In some places it eats out the iron, carrying it away entirely, and in other places merely pits it.

Mr. Parker—On one side of the pipe or the top?

The President—The upper side, generally.

Mr. Parker—The reason I asked the question was that we find ourselves bothered not with electrolysis but (after the same manner you described) in our service pipes. I never attributed it, however, to any electric action, unless it is chemical action; not by electric power, but by "horse power." That is, it is situated where hacks and wagons stand and horses irrigate and saturate the ground. It is as if rotten on the top.

The President—It carries away the iron entirely and leaves nothing behind. In the case of horses irrigating rust is left, but electrolytic action carries the iron away bodily.

Mr. Knight—We had pipe eaten away before there was electricity. In 1854 I ran a 2-inch wrought pipe opposite the "What Cheer House" down to the left of No. 5 engine house. It was in February and our streets were very muddy. Soon the gas odor got very strong and we dug down to the pipe only to find that it was all eaten out. We renewed it. By the next June or July it was ea en out again, and then we ran a cast iron pipe through named section, which lasted very well. That was before we had any electricity here. I don't know what destroyed the pipe. We laid it to the salt in the soil.

Mr. Gregory—I would like to ask why electric companies do not object to grounding the electricity as the gentleman does from Santa Cruz. It looks to me as though they were just simply tapping the electric companies' electricity, and running it into the ground. If they would tap our gas that way we would object. I would like to know why the electric companies don't object.

Mr. Cardiff—The reason is they have their railroad well grounded and it is a great benefit to them.

The Secretary—Before this matter is passed, Mr. Copley, who is First Vice President of the Western Gas Association, has made a suggestion to me which I think is very timely. It is that some concerted action should be taken by Associations of this character looking to the defense of their rights as against electrolytic action from street railway currents; and in view of the fact that at Spokane Falls an action is to be tried involving these very questions, it may become interesting and also valuable for this Association and all others to be in full possession of the testimony, expert and otherwise, and the decision of the Court in full. Mr. Aldrich being now a member of our Association, we can take up that matter with him in this way: By either the Association authorizing the payment to him of an amount of money which would be required to have a copy of all this testimony and the decisions sent to the Sectretary of this Association for distributing to the members, or by in some way aiding his Company in the prosecution of this suit. For if in the State of Washington there should be a decision handed down by the higher Court on the lines laid out by the Gas Company in its opposition—the Railroad Company being compelled to return its current over a double trolley for instance—that certainly would help the matter in this State; and if, when the decision is handed down, this Association should deem it advisable as an Association to take the matter up as a test case in some one town in other states, it could be done either by contribution of the gas companies represented in the Association to the expense, or by the Association itself. I would like to ask Mr. Aldrich if he thinks it feasible to obtain for us during the progress of the trial of this case such papers as I have outlined?

Mr. Aldrich—Mr. Chairman and Gentlemen: As the Spokane Gas Company is the only sufferer locally from this electrolysis, I could not really entertain on behalf of the Company any proposition that would result in other companies subscribing to that law suit. If we succeed—and I promise you that this shall be carried to the Court of last resort—Spokane will only be too delighted that it has done something in a small way to advance the gas interests. If we fail and it brings us into bankruptcy, perhaps we will take the hat around. We will talk about that matter later on, but so far as expert evidence and all the records are concerned I will promise you gentlemen, if you care to have it, that I will take such measures as will procure for you all the documents and all evidence, expert and otherwise, that shall be submitted at the trial. (Applause.)

No. 18.—*A Cheap Valve, Service Cock or Drop Cover made with a Pipe;* by "G. H. H."—This wrinkle consists of a piece of 4-inch or 6-inch pipe. Referring to the cuts, *A*, in Figs. 1 and 2, represents two short pieces of pipe tapped into a bell or spigot end; *B*, in Figs. 1 and 2, shows a cross and three nipples, one nipple having a long thread; *D*, in Figs. 1 and 2, is a piece of cast iron, with rim inside to fit the pipe, countersunk for the cap, which has a square or flat head; or in place of that, cut a coupling in half, and use a plug. For street valves, considering the large head, it would be necessary to remove the lid, hence tap the pipe for ¼-inch and use 1-inch pipe for the nipples in the cross, because it would be necessary to remove the cover to insert the key on account of its size. Put 1-inch cross and nipples, *B*, over the ¼-inch pieces, *A*. Place a short piece of stick in the pipe or cross to hold it upright, drop on the lid, screw on the cap or half coupling and plug, then screw up. Follow the same method in putting in place (Fig. 2) except that a 1-inch by 1¼-inch cross, with 1 inch over the ¼-inch short pieces, should be used. Through the use of the 1-inch by 1¼-inch cross the key *F* can be lowered into the box through the 1¼-inch cross by simply removing the plug *C*, leaving the lid on, and the half coupling will act as a lock nut to hold the lid in place. Have the square or flat head on the plug the same size as on the cock and one key will accomplish both. If the valve head can be cut down smaller, in Fig. 1 a 1-inch by 2-inch cross can be used, as in Fig. 2, providing the key will drop through the 2-inch cross.

For drips, bring up the ¼-inch pipe snug under cap *C*, so that in removing the plug on cap *C* the ¼-inch cap or plug from the drip is directly close up, so that it can be removed with a key. Screw on the pump.

No. 19.—*Device for Covering Outlet in Purifying Box;* by A. J. Vanderwhite.—During the last few years many of the gas companies on the Pacific Coast have adopted a system of reviving oxide of iron without removing it from the purifying boxes. This, as is well known, has been done by drawing air downward through the purifying material. In order to do this successfully it is necessary to tightly close the outlet pipe of the purifier, so that the air shall not be drawn down through this pipe around through the centerseal and into the ejecting apparatus which draws the air. This has been accomplished by tapered wooden plugs and a joint made of clay, and by many other troublesome devices. This joint may be properly called a pneumatic plug for stopping gas pipes. It is made by taking two circles of 1-inch redwood board and fastening them together with the grain running in opposite directions. On the outer edge of this circle is nailed a half section of ordinary rubber hose. Into this half circle is sprung a bicycle tire which, when pumped to its fullest capacity, engages the inner side of the pipe and the rubber on the outside of the wooden circle, making a perfectly gastight joint. When the air is let out from this tire it should be loose in the pipes so it can be easily removed. The pumping is done with an ordinary small bicycle pump.

In the illustration, as shown, the handle *A*, which is attached to the top of the wooden plug, has another separate purpose in itself than of a handle, for it extends out under the cover of the purifier, which is blocked up over the box while the reviving process is going on, and absolutely prevents the lowering of the box cover while this pneumatic plug is in place, as it would become a very annoying dead stoppage should the purifiers be changed while it is in place. The diagram really explains itself.

The Secretary—I think that is one of the most interesitng wrinkles we have ever had. The accident of leaving a plug in an outlet pipe has happened to more than one of us in our time, and this offers an effectual prevention. Besides, the idea of that bicycle tire making a complete tight joint is a novel one. It is the best thing I have ever listened to in this Association, and of most practical benefit to all of us. Perhaps Mr. Jones could enlarge upon it.

Mr. Jones—It is a source of great convenience to us at our station, and the expense of making a plug of that kind is very slight. I believe the cost of a special tire for a 20-inch pipe is about $2.50, and it will last for many years, as the rubber hose protects it on the inside. I also think the plug could be used for other purposes, since it makes a perfectly gastight joint.

The Secretary—Does Mr. Jones use an inner-tube tire, or what is called a hose-pipe tire?

Mr. Jones—A hose-pipe tire.

The Secretary—That is, an inner tube inside of the band. The air is not applied directly to the tire itself, but to the inside tube.

Mr. Foveaux—Wouldn't it be necessary to put one layer of wood over the tire and one underneath it?

Mr. Jones—Not when it is used for the purpose of preventing the air from going in, the leakage would be so slight.

No. 20.—*Lubricator for Mackenzie Exhauster;* by A. J. Vanderwhite.—Everyone who has used a Mackenzie exhauster for pumping gas understands the difficulties encountered in getting oil in contact with every bearing inside of the drums. The lack of this oil sometimes converts the exhauster into a musical instrument, and very often the wear is so great that the superintendent is disgusted with the way his exhauster is pounding. This has been remedied by the simple device described in the accompanying diagram. The cylinder *A*, made of 3 inch pipe of any desired length, is to contain oil; the amount of oil is indicated by a glass gauge. The top of this cylinder is connected by a pipe to the hand-hole plate on the head of the exhauster opposite one of the openings in the inner drum, and in this pipe is interposed a lever-handled stopcock. At the top of the 3-inch pipe is a tin funnel for the purpose of filling it with oil. This is also separated from the pipe by a lever-handled stopcock. On the bottom of the 3-inch pipe is connected a pipe, which in turn is connected with water pressure, and provided also with a lever-handled stopcock. Interposed between this stopcock and the bottom of the 3-inch pipe is an ordinary faucet for drawing off the water. To operate this device the 3-inch reservoir

should be filled with oil, through funnel *B*. Water pressure is then turned on at the bottom, which drives the oil through pipe *C* into the exhauster. Oil may be fed in any quantity, but when the water has reached the top of the gauge glass the apparatus must be shut off and the water drawn off at faucet *D*, after which the reservoir may be refilled and the operation repeated. This device has been found to work admirably and to save much friction in the running of the exhauster, and also obviates the necessity of opening it for cleaning as often as before it was used.

Mr. Adams—I would like Mr. Jones to explain this.

Mr. Jones—In the inner drum of the Mackenzie exhauster, which is eccentric to its outer shell, there are three triangular openings, and in order to get the oil on the three pins through which the blades of the exhauster pass, and on the inner bearings, it is necessary that the oil shall be shot through one of these triangular openings as they come opposite this pipe. That is the reason the pipe is put at that point on the head of the exhauster. You can shoot in any quantity of oil, thus lubricating every part of the exhauster, whereas in using the top oil cocks, it is almost impossible to get the oil where it is needed, because it strikes the outer shell of the inner drum and simply runs down through the little openings at each side of the blade. It is practically impossible to lubricate that form of exhauster excepting in this way. It uses very little oil, because the oil is place where it is most needed.

No. 21.—*Welsbach Spark Ignition;* by A. L. Rice.—Mr. A. L. Rice, of the Riverside (Cal.) Gas and Electric Company, sends the following wrinkle. I give his words verbatim: Churches and lodge rooms are good places to advertise your Welsbach lights. I am indebted to Mr. F. H. Hess, of Ann Arbor, Mich., for the following plan of spark ignition in multiple lighting of Welsbach lights in high chandeliers where the use of mica chimneys is indispensable. I have had good success with points made of 12-gauge copper wire. Cut off pieces of wire 1¼-inch long, cut thread ¼-inch long at one end, tap a small copper disk and screw on up to the shoulder. With a sharp awl punch holes in the opposite sides of the mica chimney, and ⅝-inch down from the top. I next screw end of point from inside and fasten with a second disk or lock nut on the outside; attach wire from sparking coil and bring it on with third disk or nut. Points should be about $\frac{1}{16}$-inch apart at center of chimney. Connect points between lamps with No. 24 copper wire. Glass chimneys can be used by making a brass or copper clamp to hold points, and should clamp down over the sides of chimney with points pitched down ¼-inch into chimney. The shock of ignition is so slight that, on 26 lamps which have averaged 100 nights each in one of our churches, we have not yet had a broken mantel.

The Secretary—I would like to ask Mr. Rice what power of battery he requires for lights in multiple?

Mr. Rice—In one church we are lighting this way we use a ¼-inch Ruhmkorff coil of five cells and a No. 2 Sampson battery. In another church we have a vibrator on the machine. I don't know enough about electric energy to tell you what power we use. It is good for about 10 lights.

Mr. Hollidge—I was compelled to bring the Welsbach light to the front and make it outstrip three or four electric lights, and in so doing I was compelled to spend considerable money in getting chimneys from all over the United States. I got large and small mica and a large glass. The small mica to me is the true value. The small glass chimney when it breaks will break the mantle, and that I had to discard in order to give the people an economical supply of mantles. If they broke very many they would go back to electric light, and I was compelled to study these things. I also took a lighthouse chimney and found that its top part, being of brass inside, reflected a yellow color on the mantle, thereby reducing the light, but I kept on searching and finally found a chimney made in New York—I think it is manufactured by the Phœnix Company. It is about 4 inches and has an asbestos washer on top to put the shade on. I found the best results came from these chimneys and a flat shade on the top. I think that Mr. Rice, Mr. Clements and Mr. Grant will bear me out that they have been so effectual as to drive the electric light out of every place I have introduced them. I think our Welsbach lamp service will rank relatively with that in any city in the State, although we are only a small little country town. I had to do this in order to protect myself, and I got the best results from the chimneys described. I have tried to find them when in San Francisco, and I understand that Mr. Ewing is now about to obtain them from the Company; is not that right, Mr. Ewing?

Mr. Ewing—Yes, sir.

Mr. Hollidge—While I do not desire anybody else to follow in my tracks, yet I think the best results are obtained from the Welsbach lights. I would like to ask Mr. Rice what he thought of them when he saw them in operation.

Mr. Rice—I am rather prejudiced against the large chimney on account of what I consider its ungainly appearance. I noticed, however, that Mr. Hollidge got very good results from these chimneys. I might say, though, that where the wide chimney is very generally introduced in a town so that you become accustomed to its appearance, you overlook or forget its ungainliness.

Mr. Hollidge—In conversation with Mr. Parker concerning this wrinkle, I found that he had got another wrinkle to act in conjunction with this. Providing a person did not wish to use the mica chimney you could drill a hole in the glass chimney by using the old drill

Mr. Parker—It is quick moving, and you can lubricate the drill. That is well known among mechanics.

Mr. Rice—A fatal objection to using a glass chimney on the chandelier is that it is almost impossible to get at them. In the second place, I anticipate the danger of some of these glass chimneys breaking and falling down on the congregation. I don't think a glass chimney under any circumstances would do in such a place as a church.

Mr. Parker—Some of our churches have 60 Welsbach burners, and the Masonic Hall is filled with chandeliers holdings 25 or 30 burners. We have not been bothered with any breakage of chimneys. Whether it is simply an isolated case or not I cannot say, but we have not had to make any renewals of the chimney. Of course, I recognize the fact that if they should happen to break the congregation would be disturbed, but we have not had any yet and have been using them two or three years.

No. 22.—*The Virtue of a Chart;* by J. A. Britton.—This wrinkle herewith produced is a unique idea indeed, although Mr. Britton makes no claim in any way for originality. It is simply the application of an idea which might prove useful to the gas men as it has already been tested. The "chart" is a fictitious one, of course, but displays the idea. The lines in red show the consumption, in cubic feet, during the year 1897 for the period of May, and the lines in black show the consumption for the present year. The same also applies to the yield of coal and oil in water gas plants, which may be also applied to any results in coal gas plants. By having this chart before him every day a superintendent is enabled at a glance to see the relative consumption of month with month, and to be able to grasp distinctly his yields, candle power, or any other matter in connection with his business which, without this chart, would have to be trusted to memory or looking over of accounts, which, in many instances, do not clearly fasten the matter in the mind.

The Secretary—I might state that this matter of diagramming everything in connection with the gas business is a common thing. It is used by almost all of the larger companies, but a great many of the smaller companies do not use it, and the superintendent, in the multiplicity of his duties, is bothered sometimes to remember just what his consumption was the day before yesterday, or last week, or by comparison last year, or just what his yield was in the different lines, or what his costs were in different directions. The idea of these little charts, with the pages ruled for that purpose, divided off into days of the month, is that every day, when he gets up his report, he puts a little dot down, then draws his line to complete his diagram, and he has right before him at his desk in full sight, a diagrammatically expressed outline of his entire business, without having to go to the safe and look up a book. He thus can easily make comparisons. I have found it extremely useful in my business, as have all other gas superintendents and officers that have used it. Mr. Adams who has had quite an extended experience in that line I think could interest you by telling what he does by diagramming. The adoption and carrying out of the plan will save money, hours of labor, and many an hour of thought. It does not take a second every morning to put this chart in position to let you know what you have done right along during the month.

Mr. Adams—I did it as a matter of convenience in explaining the condition of our Company's affairs to the Board of Directors. I could show them in five minutes the affairs of the Company, rather than sit down and talk to them for 20 minutes. The records are on cards, and show the output, cost of coal, sales, meters, in fact any data that you want. Instead of spending an hour or two talking about something they did not understand, they simply saw the result in five minutes and that was the end of it. I got the suggestion from Mr. Jones.

No. 23.—*Grate Bars for Generators and Furnaces;* by G. H. Hollidge.—This wrinkle will be useful to many persons where round iron or steel is not procurable. Figure 1 shows the grate bars in the generator. Take 1-inch black iron pipe and ¼-inch or ⅜-inch pipe of the same sort. Cut both to fit the furnace or generator; place the

Mr. Knight—We had pipe eaten away before there was electricity. In 1854 I ran a 2-inch wrought pipe opposite the "What Cheer House" down to the left of No. 5 engine house. It was in February and our streets were very muddy. Soon the gas odor got very strong and we dug down to the pipe only to find that it was all eaten out. We renewed it. By the next June or July it was eaten out again, and then we ran a cast iron pipe through named section, which lasted very well. That was before we had any electricity here. I don't know what destroyed the pipe. We laid it to the salt in the soil.

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The Secretary—Before this matter is passed, Mr. Copley, who is First Vice President of the Western Gas Association, has made a suggestion to me which I think is very timely. It is that some concerted action should be taken by Associations of this character looking to the defense of their rights as against electrolytic action from street railway currents; and in view of the fact that at Spokane Falls an action is to be tried involving these very questions, it may become interesting and also valuable for this Association and all others to be in full possession of the testimony, expert and otherwise, and the decision of the Court in full. Mr. Aldrich being now a member of our Association, we can take up that matter with him in this way: By either the Association authorizing the payment to him of an amount of money which would be required to have a copy of all this testimony and the decisions sent to the Sectretary of this Association for distributing to the members, or by in some way aiding his Company in the prosecution of this suit. For if in the State of Washington there should be a decision handed down by the higher Court on the lines laid out by the Gas Company in its opposition—the Railroad Company being compelled to return its current over a double trolley for instance—that certainly would help the matter in this State; and if, when the decision is handed down, this Association should deem it advisable as an Association to take the matter up as a test case in some one town in other states, it could be done either by contribution of the gas companies represented in the Association to the expense, or by the Association itself. I would like to ask Mr. Aldrich if he thinks it feasible to obtain for us during the progress of the trial of this case such papers as I have outlined?

Mr. Aldrich—Mr. Chairman and Gentlemen: As the Spokane Gas Company is the only sufferer locally from this electrolysis, I could not really entertain on behalf of the Company any proposition that would result in other companies subscribing to that law suit. If we succeed—and I promise you that this shall be carried to the Court of last resort—Spokane will only be too delighted that it has done something in a small way to advance the gas interests. If we fail and it brings us into bankruptcy, perhaps we will take the hat around. We will talk about that matter later on, but so far as expert evidence and all the records are concerned I will promise you gentlemen, if you care to have it, that I will take such measures as will procure for you all the documents and all evideuce, expert and otherwise, that shall be submitted at the trial. (Applause.)

No. 18.—*A Cheap Valve, Service Cock or Drop Cover made with a Pipe;* by "G. H. H."—This wrinkle consists of a piece of 4-inch or 6-inch pipe. Referring to the cuts, *A*, in Figs. 1 and 2, represents two short pieces of pipe tapped into a bell or spigot end; *B*, in Figs. 1 and 2, shows a cross and three nipples, one nipple having a long thread; *D*, in Figs. 1 and 2, is a piece of cast iron, with rim inside to fit the pipe, countersunk for the cap, which has a square or flat head; or in place of that, cut a coupling in half, and use a plug. For street valves, considering the large head, it would be necessary to remove the lid, hence tap the pipe for ¼-inch and use 1-inch pipe for the nipples in the cross, because it would be necessary to remove the cover to insert the key on account of its size. Put 1-inch cross and nipples, *B*, over the ¼-inch pieces, *A*. Place a short piece of stick in the pipe or cross to hold it upright, drop on the lid, screw on the cap or half coupling and plug, then screw up. Follow the same method in putting in place (Fig. 2) except that a 1-inch by 1¼-inch cross, with 1 inch over the ¼-inch short pieces, should be used. Through the use of the 1-inch by 1¼-inch cross the key *F* can be lowered into the box through the 1¼-inch cross by simply removing the plug *C*, leaving the lid on, and the half coupling will act as a lock nut to hold the lid in place. Have the square or flat head on the plug the same size as on the cock and one key will accomplish both. If the valve head can be cut down smaller, in Fig. 1 a 1-inch by 2-inch cross can be used, as in Fig. 2, providing the key will drop through the 2-inch cross.

For drips, bring up the ¼-inch pipe snug under cap *C*, so that in removing the plug on cap *C* the ¼-inch cap or plug from the drip is directly close up, so that it can be removed with a key. Screw on the pump.

No. 19.—*Device for Covering Outlet in Purifying Box;* by A. J. Vanderwhite.—During the last few years many of the gas companies on the Pacific Coast have adopted a system of reviving oxide of iron without removing it from the purifying boxes. This, as is well known, has been done by drawing air downward through the purifying material. In order to do this successfully it is necessary to tightly close the outlet pipe of the purifier, so that the air shall not be drawn down through this pipe around through the centerseal and into the ejecting apparatus which draws the air. This has been accomplished by tapered wooden plugs and a joint made of clay, and by many other troublesome devices. This joint may be properly called a pneumatic plug for stopping gas pipes. It is made by taking two circles of 1-inch redwood board and fastening them together with the grain running in opposite directions. On the outer edge of this circle is nailed a half section of ordinary rubber hose. Into this half circle is sprung a bicycle tire which, when pumped to its fullest capacity, engages the inner side of the pipe and the rubber on the outside of the wooden circle, making a perfectly gastight joint. When the air is let out from this tire it should be loose in the pipes so it can be easily removed. The pumping is done with an ordinary small bicycle pump.

In the illustration, as shown, the handle *A*, which is attached to the top of the wooden plug, has another separate purpose in itself than of a handle, for it extends out under the cover of the purifier, which is blocked up over the box while the reviving process is going on, and absolutely prevents the lowering of the box cover while this pneumatic plug is in place, as it would become a very annoying dead stoppage should the purifiers be changed while it is in place. The diagram really explains itself.

The Secretary—I think that is one of the most interesitng wrinkles we have ever had. The accident of leaving a plug in an outlet pipe has happened to more than one of us in our time, and this offers an effectual prevention. Besides, the idea of that bicycle tire making a complete tight joint is a novel one. It is the best thing I have ever listened to in this Association, and of most practical benefit to all of us. Perhaps Mr. Jones could enlarge upon it.

Mr. Jones—It is a source of great convenience to us at our station, and the expense of making a plug of that kind is very slight. I believe the cost of a special tire for a 20-inch pipe is about $2.50, and it will last for many years, as the rubber hose protects it on the inside. I also think the plug could be used for other purposes, since it makes a perfectly gastight joint.

The Secretary—Does Mr. Jones use an inner-tube tire, or what is called a hose-pipe tire?

Mr. Jones—A hose-pipe tire.

The Secretary—That is, an inner tube inside of the band. The air is not applied directly to the tire itself, but to the inside tube.

Mr. Foveaux—Wouldn't it be necessary to put one layer of wood over the tire and one underneath it?

Mr. Jones—Not when it is used for the purpose of preventing the air from going in, the leakage would be so slight.

No. 20.—*Lubricator for Mackenzie Exhauster;* by A. J. Vanderwhite.—Everyone who has used a Mackenzie exhauster for pumping gas understands the difficulties encountered in getting oil in contact with every bearing inside of the drums. The lack of this oil sometimes converts the exhauster into a musical instrument, and very often the wear is so great that the superintendent is disgusted with the way his exhauster is pounding. This has been remedied by the simple device described in the accompanying diagram. The cylinder *A*, made of 3 inch pipe of any desired length, is to contain oil; the amount of oil is indicated by a glass gauge. The top of this cylinder is connected by a pipe to the hand-hole plate on the head of the exhauster opposite one of the openings in the inner drum, and in this pipe is interposed a lever-handled stopcock. At the top of the 3-inch pipe is a tin funnel for the purpose of filling it with oil. This is also separated from the pipe by a lever-handled stopcock. On the bottom of the 3-inch pipe is connected a pipe, which in turn is connected with water pressure, and provided also with a lever-handled stopcock. Interposed between this stopcock and the bottom of the 3-inch pipe is an ordinary faucet for drawing off the water. To operate this device the 3-inch reservoir

should be filled with oil, through funnel *B*. Water pressure is then turned on at the bottom, which drives the oil through pipe *C* into the exhauster. Oil may be fed in any quantity, but when the water has reached the top of the gauge glass the apparatus must be shut off and the water drawn off at faucet *D*, after which the reservoir may be refilled and the operation repeated. This device has been found to work admirably and to save much friction in the running of the exhauster, and also obviates the necessity of opening it for cleaning as often as before it was used.

Mr. Adams—I would like Mr. Jones to explain this.

Mr. Jones—In the inner drum of the Mackenzie exhauster, which is eccentric to its outer shell, there are three triangular openings, and in order to get the oil on the three pins through which the blades of the exhauster pass, and on the inner bearings, it is necessary that the oil shall be shot through one of these triangular openings as they come opposite this pipe. That is the reason the pipe is put at that point on the head of the exhauster. You can shoot in any quantity of oil, thus lubricating every part of the exhauster, whereas in using the top oil cocks, it is almost impossible to get the oil where it is needed, because it strikes the outer shell of the inner drum and simply runs down through the little openings at each side of the blade. It is practically impossible to lubricate that form of exhauster excepting in this way. It uses very little oil, because the oil is place where it is most needed.

No. 21.—*Welsbach Spark Ignition;* by A. L. Rice.—Mr. A. L. Rice, of the Riverside (Cal.) Gas and Electric Company, sends the following wrinkle. I give his words verbatim: Churches and lodge rooms are good places to advertise your Welsbach lights. I am indebted to Mr. F. H. Hess, of Ann Arbor, Mich., for the following plan of spark ignition in multiple lighting of Welsbach lights in high chandeliers where the use of mica chimneys is indispensable. I have had good success with points made of 12-gauge copper wire. Cut off pieces of wire 1¼-inch long, cut thread ¼-inch long at one end, tap a small copper disk and screw on up to the shoulder. With a sharp awl punch holes in the opposite sides of the mica chimney, and ¾-inch down from the top. I next screw end of point from inside and fasten with a second disk or lock nut on the outside; attach wire from sparking coil and bring it on with third disk or nut. Points should be about $\frac{1}{16}$-inch apart at center of chimney. Connect points between lamps with No. 24 copper wire. Glass chimneys can be used by making a brass or copper clamp to hold points, and should clamp down over the sides of chimney with points pitched down ¼-inch into chimney. The shock of ignition is so slight that, on 26 lamps which have averaged 100 nights each in one of our churches, we have not yet had a broken mantel.

The Secretary—I would like to ask Mr. Rice what power of battery he requires for lights in multiple?

Mr. Rice—In one church we are lighting this way we use a ½-inch Ruhmkorff coil of five cells and a No. 2 Sampson battery. In another church we have a vibrator on the machine. I don't know enough about electric energy to tell you what power we use. It is good for about 10 lights.

Mr. Hollidge—I was compelled to bring the Welsbach light to the front and make it outstrip three or four electric lights, and in so doing I was compelled to spend considerable money in getting chimneys from all over the United States. I got large and small mica and a large glass. The small mica to me is the true value. The small glass chimney when it breaks will break the mantle, and that I had to discard in order to give the people an economical supply of mantles. If they broke very many they would go back to electric light, and I was compelled to study these things. I also took a lighthouse chimney and found that its top part, being of brass inside, reflected a yellow color on the mantle, thereby reducing the light, but I kept on searching and finally found a chimney made in New York—I think it is manufactured by the Phœnix Company. It is about 4 inches and has an asbestos washer on top to put the shade on. I found the best results came from these chimneys and a flat shade on the top. I think that Mr. Rice, Mr. Clements and Mr. Grant will bear me out that they have been so effectual as to drive the electric light out of every place I have introduced them. I think our Welsbach lamp service will rank relatively with that in any city in the State, although we are only a small little country town. I had to do this in order to protect myself, and I got the best results from the chimneys described. I have tried to find them when in San Francisco, and I understand that Mr. Ewing is now about to obtain them from the Company; is not that right, Mr. Ewing?

Mr. Ewing—Yes, sir.

Mr. Hollidge—While I do not desire anybody else to follow in my tracks, yet I think the best results are obtained from the Welsbach lights. I would like to ask Mr. Rice what he thought of them when he saw them in operation.

Mr. Rice—I am rather prejudiced against the large chimney on account of what I consider its ungainly appearance. I noticed, however, that Mr. Hollidge got very good results from these chimneys. I might say, though, that where the wide chimney is very generally introduced in a town so that you become accustomed to its appearance, you overlook or forget its ungainliness.

Mr. Hollidge—In conversation with Mr. Parker concerning this wrinkle, I found that he had got another wrinkle to act in conjunction with this. Providing a person did not wish to use the mica chimney you could drill a hole in the glass chimney by using the old drill

Mr. Parker—It is quick moving, and you can lubricate the drill. That is well known among mechanics.

Mr. Rice—A fatal objection to using a glass chimney on the chandelier is that it is almost impossible to get at them. In the second place, I anticipate the danger of some of these glass chimneys breaking and falling down on the congregation. I don't think a glass chimney under any circumstances would do in such a place as a church.

Mr. Parker—Some of our churches have 60 Welsbach burners, and the Masonic Hall is filled with chandeliers holdings 25 or 30 burners. We have not been bothered with any breakage of chimneys. Whether it is simply an isolated case or not I cannot say, but we have not had to make any renewals of the chimney. Of course, I recognize the fact that if they should happen to break the congregation would be disturbed, but we have not had any yet and have been using them two or three years.

No. 22.—*The Virtue of a Chart;* by J. A. Britton.—This wrinkle herewith produced is a unique idea indeed, although Mr. Britton makes no claim in any way for originality. It is simply the application of an idea which might prove useful to the gas men as it has already been tested. The "chart" is a fictitious one, of course, but displays the idea. The lines in red show the consumption, in cubic feet, during the year 1897 for the period of May, and the lines in black show the consumption for the present year. The same also applies to the yield of coal and oil in water gas plants, which may be also applied to any results in coal gas plants. By having this chart before him every day a superintendent is enabled at a glance to see the relative consumption of month with month, and to be able to grasp distinctly his yields, candle power, or any other matter in connection with his business which, without this chart, would have to be trusted to memory or looking over of accounts, which, in many instances, do not clearly fasten the matter in the mind.

The Secretary—I might state that this matter of diagramming everything in connection with the gas business is a common thing. It is used by almost all of the larger companies, but a great many of the smaller companies do not use it, and the superintendent, in the multiplicity of his duties, is bothered sometimes to remember just what his consumption was the day before yesterday, or last week, or by comparison last year, or just what his yield was in the different lines, or what his costs were in different directions. The idea of these little charts, with the pages ruled for that purpose, divided off into days of the month, is that every day, when he gets up his report, he puts a little dot down, then draws his line to complete his diagram, and he has right before him at his desk in full sight, a diagrammatically expressed outline of his entire business, without having to go to the safe and look up a book. He thus can easily make comparisons. I have found it extremely useful in my business, as have all other gas superintendents and officers that have used it. Mr. Adams who has had quite an extended experience in that line I think could interest you by telling what he does by diagramming. The adoption and carrying out of the plan will save money, hours of labor, and many an hour of thought. It does not take a second every morning to put this chart in position to let you know what you have done right along during the month.

Mr. Adams—I did it as a matter of convenience in explaining the condition of our Company's affairs to the Board of Directors. I could show them in five minutes the affairs of the Company, rather than sit down and talk to them for 20 minutes. The records are on cards, and show the output, cost of coal, sales, meters, in fact any data that you want. Instead of spending an hour or two talking about something they did not understand, they simply saw the result in five minutes and that was the end of it. I got the suggestion from Mr. Jones.

No. 23.—*Grate Bars for Generators and Furnaces;* by G. H. Hollidge.—This wrinkle will be useful to many persons where round iron or steel is not procurable. Figure 1 shows the grate bars in the generator. Take 1-inch black iron pipe and ½-inch or ¾-inch pipe of the same sort. Cut both to fit the furnace or generator; place the

¾-inch or ½-inch inside the 1-inch pipe, stand them on end, as shown in Fig. 2, and fill both with fireclay and brick dust mixed into a liquid state; common clay dobie will act precisely the same. Finding ourselves without 1¼ inch iron in town, this method was resorted to and gave such good success that we have purchased no more 1¼-inch round iron since, using exclusively the above. A 1-inch black pipe filled with clay, without the pipe inside, will act just the same but will not last as long. The two pipes and clay make a very solid bar and will act in either as above stated.

Mr. Hollidge—I would say in relation to this that we clean our generator out every Monday morning. After it had been in operation some short time I thought the bars were getting so thin that they would not last another week, and I made up my mind to get a new set of bars. Going to the shops in town I was unable to procure the iron needed, consequently I had to introduce some kind of scheme that would stand a generator blast, so I filled an inch pipe with clay and common adobe, ramming it thoroughly home, with a cap on a small piece of pipe, so I had no fear of it melting. This pipe lasted us about two weeks, at the end of which time the fire began to come through the outer pipe and go into the clay. I then got a piece of inch pipe and cut it off to the desired length, and inside it put a piece of ⅝ pipe, cutting it exactly the length of the inch, and filled both up with a solution of fireclay and brick dust mixed in liquid form. I rammed them home as well as I could and let them settle, and I used them nearly four months. They have given me such results that I have deemed it advisable not to spend any more money in buying inch bar iron or steel.

No. 24.—*White Lead in Collapsible Tubes;* by Mr. E. C. Jones.—Where white lead is used by gasfitters in an open pot it is apt to be upset, and at best the top of the lead will harden, forming a scum which must be removed. Even the neatest of these pots with covers for containing lead are apt to destroy carpets, etc., when used by gas stove men in setting grates and ranges. If the lead is mixed of proper consistency and placed in collapsible lead tubes, the same as are used by oil color artists, it may be taken from the tube as wanted, without the use of any stick and with perfect neatness. In using, the lead should be squeezed from the large end of the tube through the small aperture, and as the lead is squeezed out the sheet lead tube should be rolled up from the large end.

Mr. Hollidge—I think for inside fittings that is one of the neatest little things I have ever seen.

The President—Does Mr. Jones procure the lead in tubes, or does he fill the tubes himself?

Mr. Jones—So far we have bought the tubes. They are comparatively inexpensive, costing but a few cents each, and can be refilled. It is necessary to use care in squeezing from the large end of the tube, so as not to trap the lead in the tube, and then roll the sheet lead up carefully so that you squeeze the lead from it. The tube gradually grows shorter. Of course it is airtight, there is no drying of the lead, and you always have lead of the proper consistency to be used.

The President—I suppose those tubes can be procured from sellers of paints?

Mr. Jones—Yes, sir. Ours were filled by one of the paint men with whom we trade, at a cost of 10 cents each complete. They have all sizes. The one shown in the cut is ¼ of an inch, but they have them as large as 1 inch.

The President—It is a very neat device. Nearly every gasfitter carries a cup with him, and it is a general nuisance among his tools.

Mr. Aldrich—I am very much obliged to Mr. Jones for this. The dirtiest thing about a gasfitter's bench is his white lead outfit and the way in which he uses it. I shall certainly adopt the Jones method.

Mr. Osborne—Many times in putting in brass fittings white or red lead will show, but if you put enough ochre in the white lead to turn it yellow it will not show.

Mr. Parker—I suggest that a mixture of beeswax and tallow is good.

Mr. Jones—I suggest that Mr. Parker put his beeswax and tallow in collapsible tubes.

No. 25.—*Lighting Purifying Houses by Incandescent Electric Lights.*—The lighting of purifying houses has usually been done by wall lights, which are lighted from outside the building. By neglect in caring for them the glasses become broken or loosened in their frames and the lights are seldom used. The purifying house and cellar at North Beach Station, San Francisco, has recently been lighted by a special lamp, which consists of a 16-candle power incandescent electric light, inclosed in a strong outer glass globe which is provided with a spring valve, opening outward. Should there be any expansion of air between the incandescent lamp and the outer globe the expanded air is relieved by this small valve. This outer globe is air and gastight from the outside, and as expanded air is expelled from the inside of the globe the pressure on the outside is greater than on the inside and the little valve becomes seated more tightly. By this means of lighting there is no danger in changing purifiers at night or doing any repair work in the purifying house. The wiring is protected by iron armor conduit sealed after the manner of ordinary gas piping. This armor thoroughly prevents accidents due to abrasion, and the possibility of fire which might be caused by an accidental short circuit.

Mr. Hollidge—Perhaps Mr. Poole would explain this lamp to us.

Mr. Poole—An example of the lamp and fittings is on the desk. It is almost self-explanatory, but the application of it is new. I do not know that it has been tried before. It is due to the researches of Mr. Jones in his progressive way, who always wants something better than the other fellow has got. Upon consultation we concluded to adopt this for a protective lamp. It is used largely on ship work, and is protected from water as well as other influences. A small rubber washer in the brass cap or holder is put on in such a way that it is squeezed on comparatively tight, and excludes the possibility of any gas or outside pressure entering it. A small safety valve does away with any excessive pressure on the inside and prevents the explosion of the film. There is liability of some little pressure from hot gas and the resulting expansion of the air, but that is relieved by a small valve on the outside which prevents any injury inside in the way of gas causing an explosion. I have used something of the same principle in coal mines where there is an accumulation of natural gases from the coal, and found it very effective. It is a very nice thing under ground, much preferable to candles and the ordinary oil lamp, and in mines where there is a great deal of explosive gas. They generally use what is called the Davy lamp, of a very poor illuminating capacity and the theory of a non-explosive lamp depends upon the gauze which surrounds the flame radiating the heat of the gas which might explode within, preventing it from becoming hot enough to explode the outside gases. This will accomplish every purpose that that does, besides giving four or five times as much illuminating power. This particular tube is a shell of wood about one-eighth of an inch in thickness, put in two parts and pressed through wires, which are drawn through the little cylindrical cap screwed to the wall of buildings, with receptacles at proper distances whereby the wire is fished through and drawn up properly very complete.

The Secretary—We have been lighting our purifying house and the basement of our meter room for over a year, with electric lights, but not protected in the manner described; we use the ordinary Clark cable for conductors, and have no protective covering over the lamps. We run lamps of high potential on a low potential transformer, and so do not get quite full 16 candle power, but sufficient for all purposes at night. Does Mr. Poole think there would be any danger whatever by the breaking of an incandescent lamp in the purifying house, supposing the lamp should be shattered from any cause.

Mr. Poole—If gas is present in explosive quantity there is danger. If by accident you break a globe while the lamp is lighted the film at once becomes incandescent, and burns out with a heat or flame sufficient to ignite the gas.

Mr. Jones—I think the danger of a naked lamp in a purifying house would be about once in 10,000 times; but you know a gas man always "runs against" that once. Those perfect conditions for an explosion would exist just at that chance time. It may seem like "letting down" for a gas man to use electricity in his purifying house, and if there is any feeling on the part of the gas man I might say that you know sometimes a fellow has to take a little calomel for a bad liver—which is not pleasant, but necessary. You can look at it in that light if you choose.

Mr. Poole—That is a very mild way of admitting there is some virtue in electricity.

Mr. Aldrich—While my religion would not allow me to admit that in any shape or form in our gas works, it is quite new to me that any gentleman present allows a light of any kind in his purifying house. In Spokane I do not permit a light of any character. The changing of purifiers has to take place in the daytime, and I do not allow the conditions to become such that it is necessary to change the boxes during the night. I hope there will not be many converts to electric light either inside or outside of the purifying house.

The Secretary—I cannot forbear rising to compliment Mr. Aldrich. I have been before this Association many years and cannot but admire a man who has the nerve to stay by his first convictions so strongly as

he has done since he came in here. (Applause.) I admired the manner in which he telegraphed me from Spokane, "Put my name down as an applicant for membership. I will be there." I read in that something coming. I knew when we got Mr. Aldrich here we were going to have something on the gas proposition, and he has stood by his colors nobly. I think we ought to recognize it. We are a Gas Association, and he is the one man in five years who has stood up to that alone, and that only.

Mr. Hollidge—At the beginning of this year gas stoves had never been introduced in our section of the country, and seeing that the output was getting rather low in the summer time, I was desirous of introducing stoves of some kind. I got stoves of many different descriptions—cooking stoves, tailor stoves, stoves for baths, and every conceivable sort I could think of—and I spent quite a sum of money in those purchases. Then I set to work to get them out in order to keep my gas account up. I advertised in the papers, but that did not reach the people as quick as I desired. I made up my mind, however, that I was going to reach the eye of the consumer, and so I had the conditions of what we intended to do in putting out the stoves placed on the gas and electric light bills, and by that means I brought it directly before them. I must say I met with great success. I got out nearly 40 stoves in 10 weeks. I sold outright. I don't offer it as a wrinkle, but I offer it as a hint that if one tries persistently one is bound to succeed.

ANOTHER ELECTION TO MEMBERSHIP.

The Secretary—At this juncture, where Editor Hollidge's budget of wrinkles has been disposed of, I desire to say that the Directors have recommended the election of Mr. E. Frank Cheffins, Superintendent of the Petaluma (Cal.) Gas Company, to membership in this Association. If there is no objection he will be enrolled as a member. Hearing none, I will consider him enrolled.

The President—It is so ordered.

[To be Concluded.]

Experience with Prepayment Meters.

[A paper read by MR. R. ROSS, of Dungannon, before the North of Ireland Association of Gas Managers.]

As some of the members may be contemplating the desirability of introducing prepayment gas meters, perhaps I may be allowed to give my experience with them. In doing so, I would mention that, as far as it has been possible to obtain information, I claim to have as many—if not more—of these meters in use as there are in any works in Ireland. Up to date, I have over 100 fixed, and more wanted.

We entertained the idea of introducing prepayment meters in the summer of 1896, and obtained samples from about five firms. We determined on using nothing less than 3-light meters. On testing them, we found there were only two firms whose meters we could depend on. Having decided as to the meters, we issued circulars among those whom we expected would respond; and we had applications coming in faster than we expected, or than we could attend to. In our circular we proposed to put in a service, fix a meter, and put up one, two or three brackets free of charge; the meter and fixtures remaining the property of the Company, and removable at any time.

We commenced about August to fix the meters; and before the end of the year we had 60 at work. From March, 1897, to March, 1898, the gas consumed in these meters amounted to between 300,000 and 400,000 cubic feet. This is not a large quantity; but still it has increased our revenue.

In other places where prepayment meters have been introduced, they charge a small percentage over and above the price to ordinary consumers; but in our case we did not do so. Quite the reverse, as on calculating the gas to be supplied for a penny at the same amount as ordinary consumers paid, there was half a cubic foot over; and we gave this half foot to the consumers. Therefore the prepayment meter consumers have gas this much cheaper than the ordinary consumers.

The cost of fitting up the houses, including compo. pipe, brackets, fitters' time and service, amounts, on an average, to about 30s., exclusive of meter. In kitchens or halls, we gave a strong wing or mantelpiece joint; and in bedrooms, a neat bronzed bracket, with gallery, but no globes. The smallest compo. pipe used is not less than ⅜-inch; and, unless asked for, we supply nothing larger than a No. 3 burner. The greater portion of the consumers have invested in an economizer, slipped over the burner. This certainly increases the light; but it does not reduce the consumption of gas.

At first, I had a lot of trouble with the consumers as to the number of hours the pennyworth of gas would last; and one party would say that theirs burned for 6 hours, another 6½, and so on. I was also told by some of the consumers that, unless they got a meter the same as so-and-so, which gave light for two hours longer than theirs, they would abandon prepayment meters. But I found there were two or three of the consumers who were circulating false reports as to the number of hours their meters gave light, in order to annoy those who were discontented; and on this being explained, the trouble ceased. The pennyworth of gas lasts with a No. 3 burner about 4 hours; and with a No. 2 burner, 5 hours.

I had some trouble also with consumers owing to the fact that they would only put in one penny and allow the gas to burn out. Of course, as the valve closes gradually, they were thus, at the latter part of the time, with very little light. But I advised them to put in sixpence or a shilling in coppers, and showed them how to ascertain at any time how much gas was still due to them. Now each consumer knows what he burns weekly, and puts in the box as many coppers on a Saturday as will give him light during the week.

At first I was much troubled with crooked pennies; some nights as many as six of the consumers sending complaints that they had put in a penny, but that the handle would not turn, and they had no light. Of course, I had to go and get the pennies out; and sometimes this was rather troublesome. But the beaten-out penny is worse, as I had to uncouple the meter, turn it upside down, and insert the blade of a knife to get the coin out. However, the consumers are now getting more cautious, and examine the penny before putting it in the meter.

Another trouble I found was that in some of the meters the money box was not tight up to the sides of the case, and one copper got jammed between the box and the case; another followed, and so on, until the mechanism became jammed, and the box had to be opened to relieve the coppers. But I splayed out the top of the boxes of those that thus troubled us, and made them fit tight to the side of the cases, and thus prevented the coppers jamming.

We have up to the present time removed the coppers quarterly; but in the quarters ending December and March a good many of the boxes are full. I have got as much as 30s. from some of them; and there are a few where I have had to go and take out some coppers and replace with silver, as the pennies have no fall. I believe it would be better to remove the coppers monthly, at least in winter.

I was asked to call on one consumer, who informed me he had put in a half crown by mistake, and the meter was stuck. I had to disconnect and turn the meter upside down before I could get the coin out. In two other instances I got a 2-shilling piece among the coppers. These had been put in by mistake for pennies, and of course I returned them.

Now that the consumers are getting used to the meters, and taking care about the crooked and beaten out pennies, there is very little trouble with them; and we have a class of consumers who would not be secured in any other way. They appreciate gas, and not one has given up his supply. With the exception of two or three, they are all new consumers. These two or three were parties who were rather dilatory in paying their gas bills, and they requested to be provided with a prepayment meter. I asked why they wanted them, and they told me that in their case, when the quarter came round, they had some trouble in finding the money for the gas. But they would never miss a penny now and then with the prepayment meter; and when the quarter expired, the money was there in the box for the gas. It is really surprising the number of pennies that are obtained from some boxes, in the houses of the poorer classes. In some instances they are rather astonished when the money is being counted out of the boxes.

I shall have some more of the meters to fix, as there are more applicants, but not to any great extent. All who have adopted the system are well pleased, and although it adds to the duties of the manager, and leads to him being called out at untimely hours—in some cases to unfix a crooked or beaten out penny—he is thanked for his trouble. We have added somewhat to our consumption, and are well pleased with the results.

We find no trouble in disposing of the coppers, as between the mill, the factory and the bank we get quit of them all. But £34 of coppers is no joke to get removed from the boxes, counted and put away in lots. It takes some time and involves some trouble.

Since writing the above, I have seen that at the annual meeting of the North British Association of Gas Managers, held on July 28, Mr. Andrew Wilson, of Perth, said there were 1,100 penny-in-the-slot meters in working-class houses and lodging houses in Perth, and that these meters gave the best pecuniary return. Mr. Ballantyne, of Rothesay, said this type of meter had a great future before it; and Mr.

T. Wilson, of Coatbridge, said there were 1,400 of these meters in use in his town, and that they now gave 28 cubic feet of gas for 1d. Very few of us, at least in inland towns, can give that amount of gas for the penny; but in Coatbridge they can well afford to do so, as I saw not very long ago that they can get coal laid inside the works at 6s. 6d. per ton. Some of us pay that amount per ton as freight from Belfast. The meter is seemingly going ahead in Scotland, as I also see that they are going to introduce it in Paisley. But think of the enormous number of these meters in use belonging to the great London Gas Companies—the Gaslight and Coke Company with 90,000, and the South Metropolitan Company with 72,000, and to each of which is attached a small gas cooker. At one collection they lift over 12 tons of coppers in lorries.

Discussion.

The President said they had heard Mr. Ross's statement as to how he had succeeded with penny-in-the-slot meters. If any gentlemen present were contemplating introducing them, he was sure Mr. Ross would give them any information he conld. He (the President) himself had a view of these meters in Portadown; though not so many as Mr. Ross—he wished he had. However, he had somewhere about forty, and he found that the people were very well pleased with them. They gave a little more trouble than other meters, but they paid.

Mr. T. Hands (Enniskillen) asked the number of feet of gas Mr. Ross gave for 1d., and the cost of putting the meters in.

Mr. Ross—About 30s. each.

Mr. Hands said he had tried every maker's meter, and had a number of prepayment meters giving satisfaction. He remembered putting one in for a shoemaker, who would say to his customers: "Just put a penny in this slot, and you will see a bird come up and sing." A good many pennies were got by him in this way, and so he had his gas for nothing. He (Mr. Hands) had had a great deal of trouble with the meters, but he now thought that they were the backbone of the gas industry. The money was in them, and they secured consumers whom they could not get before, because they had not the money wherewith to pay a quarter's bill.

Mr. G. R. Love (Dundalk) remarked that Mr. Ross was much more go-ahead than he would be. He found that he had about a hundred meters fixed, and that he supplied compo. pipe, bracket, time, etc., at a cost of something like 30s. each. The Company Mr. Ross represented spent about £150 of capital upon these meters for the sake of getting a few additional consumers. This might be of little consequence where the population was settled; but if they had a shifty population, it would be a considerable loss, because they might have to remove the brackets. Mr. Ross pointed out that consumers often got half a cubic foot of gas cheaper than consumers with ordinary meters. This was an unusual thing, because nearly all gas companies charged something extra to prepayment meter consumers. He thought Mr. Ross's Company were dealing exceptionally liberally with these consumers, and he did not think that anything that was supplied in this way for nothing was appreciated so much as it would be if they charged a little for it. He did not consider that he would go so far as Mr. Ross in this respect. Like Mr. Hands, he would be glad to know the quantity of gas Mr. Ross gave for 1d. As for his troubles, these also added to his expense. He had more collections; he had the coppers to take up, which he had not with ordinary meters, and he had the coppers to dispose of. This entailed a good deal of trouble and expense beyond the £150. He thought it was unprofitable thing to go on on the lines laid down by Mr. Ross; and he (Mr. Love) certainly should not like to submit such a scheme to his Directors.

Mr. T. Frizelle (Holywood) said Mr. Ross's experience had been a very instructive and interesting one. Anything which tended to increase the consumption of gas would be hailed by every gas manager. The prepayment meter had been a great boon to them, as well as to consumers who were not in a position to pay quarterly accounts. In the first place, it removed the cause of accident in the matter of oil lighting, which had led to so many deaths; and it furnished a light on easy terms. The Company he had the honor to serve introduced prepayment meters about twelve months ago. They also held an exhibition of gas stoves. The result had been very satisfactory. They had 80 slot meters in use, and almost all the consumers who used them were new, having been previously oil burners. The consumption of gas with each of these meters had been about 7,000 cubic feet, and they had not been working for a full year. The price was the same as was charged by Mr. Ross, and they gave 20 cubic feet of gas for 1d. His Directors had also resolved to pay for the brackets, as well as the service pipes put into all houses the valuation of which did not exceed £8. He could assure the members that these meters were the means of bringing gas within the reach of consumers they would not otherwise have. They, as managers, liked augmented consumption, and so did their Directors, for the reason that the profits were increased, which was a sign of progress. From the 80 meters he (Mr. Frizelle) had, they had lifted £110 5s. Mr. Ross did not lift so much with his. He had no reason to regret putting in prepayment meters, and his Company were recovering any expenses they incurred in connection with them.

The Hon. Secretary said he felt the members were very deeply indebted to Mr. Ross for bringing the subject of prepayment meters before the Association. He would very much like some of those who had not had experience with prepayment meters to ask questions of Mr. Ross, because he was sure they had been thinking about these meters, and there might have been difficulties in the way which prevented their adopting them, and things might have occurred to them which Mr. Ross, or some others who had had experience, might be able to clear away. His own experience agreed to a large extent with that of Mr. Ross, though he had not pushed the thing as that gentleman had done. He had had too much to do, for one thing; and for another, he had often been uncertain in regard to the policy, which had been disputed, of fitting up houses for prepayment consumers. He had not attempted anything of the sort. He treated these consumers just as he treated ordinary ones. The Company put in the service pipe through the wall, and supplied them with a slot meter. The people themselves connected this with the service, and laid what pipes and fittings they wanted, and had the gas at the same price as the other consumers—22½ cubic feet for 1d. They had experienced some of the troubles about which Mr. Ross had spoken. The crooked penny was an awful nuisance. Sometimes he had to send a meter back to the maker because he could not get the penny out. He had never found a paper disc in a prepayment meter; but he had had soda water capsules beaten out. The finding of one of these things led to a row or a threat that the meter would be taken away. A prepayment meter was not in the same position as an automatic machine at a railway station, because, in the case of the meter, they knew who put in the bad coin. He had only about 45 penny-in-the-slot meters in use, and the average return from them was 30s. or 32s. a year. Last year he had £78 out of 44 meters. He found that the average number of these meters in use kept about the same. After they had had a customer for some time with a slot meter, and found he was doing right, they occasionally gave him an ordinary meter; but then somebody else would possibly be applying for a slot meter. People did not go to the expense of fitting up their houses for the use of gas without having made up their minds to burn it; and when once they had incurred the expense, they would think twice before they gave it up. In getting a number of new consumers, they had not to look at the £150 they expended to secure them, but to the million or so cubic feet more gas which they would sell in a year. Beyond this, there were staff expenses which did not increase with the quantity of gas produced. The cost of the extra gas made was little more than the price of the coal. They could therefore well afford to supply the gas cheaper, even in the first instance, because they were bringing in a new set of customers. He thought there were two ways of looking at this question. While Mr. Love might be very clear in his opinion, there was plenty to be said on Mr. Ross's side, too, and he believed that if the latter gentleman found it pay him, he would not care very much what others might say.

Mr. E. Stears (Lisburn) said he had found it to be a very great drawback that he could not furnish a supply of gas without a deposit; but prepayment meters obviated this. He gave 20 cubic feet for 1d., and sold gas by ordinary meters at 3s. 6d. per 1,000 cubic feet, which was practically the same. But the great advantage of the prepayment system was that, if there were fittings in the house, the consumer had a slot meter put in free. He did not go past the meter. These meters gave him no trouble. One or two pennies might stick; but this was a trifling matter.

Mr. Love said he forgot to mention that he had a great number of prepayment meters attached to cooking stoves, in the use of which they were a great help. He supplied gas for cooking, heating and motive power at 7½d. per 1,000 cubic feet less than for lighting; and he had separate services.

Mr. A. Gibb (Newry) thought prepayment meters were a very useful adjunct to gas works. By them a manager could get at a class of consumers who never could be reached otherwise. As had already been said, there was a difficulty in getting 5s., 10s. or 15s. at the end of a quarter; but they could obtain far more than this by the prepayment meter. People were in the habit of buying a pennyworth of oil, and never thought of the penny—it was the come-at-ableness of the thing they thought of. It was not so with 5s. or 10s.; but people dropped a

penny into a prepayment meter now and again, and the consequence was that, in small greengrocery and the like establishments, they would now go in for a very large supply, and by this means they considerably increased their consumption. He had only had prepayment meters for two years and a half; and he had never canvassed anybody to take them in. The first half year he sold 47,409 cubic feet by two or three of them; the next year it was 121,767 cubic feet; and last year, with 32 meters, he sold 1,085,395 cubic feet. So that they were going quietly along, and were substantially increasing their consumption. Moreover, they were not asking anyone for a deposit. They connected the meter, and the consumers did all the inside fittings themselves. He thought that if gas managers were to try to cultivate the introduction of penny-in-the-slot meters, they would find that they would lead to a large additional consumption of gas. He had, on two occasions, found a two-shilling piece instead of a penny. He had very great satisfaction in testifying to the worth of the paper Mr. Ross had brought before them.

Mr. Stears mentioned that the man he sent out to collect the money took with him a bag for every meter, into which he put the money, and did not count it before the consumer. He thought this was a very good plan, because they might think they were consuming too much gas if they saw how much money there was.

The Hon. Secretary, Mr. Gibb, the President, and Mr. Hands remarked that this was their plan.

Mr. Ross, in reply, said Mr. Love complained about giving half a cubic foot of gas by way of abatement; but his object was to increase his consumption. About six tenants who had prepayment meters in his place had shifted; and the houses they left had been more readily taken because the gas fittings were all in. He did not charge meter rents for either prepayment or ordinary meters. He gave 15 cubic feet of gas for 1d., which came out at about 5s. 6¾d. per 1,000 cubic feet. It was a point in his favor that in some houses, where they would not give perhaps 10s. for all that was in the place, they might now get 15s. for gas. He was perfectly satisfied. He had increased his consumption, and expected to increase it more. He had one cooker attached to a prepayment meter, and possibly by next year he might be able to tell them something about the application of prepayment meters to cookers.

The President expressed his pleasure at the interesting discussion they had had. He pointed out that one thing which they had all forgotten to mention was that if they had a consumer using an ordinary meter, and had any difficulty in getting money from him, they could simply put in a prepayment meter, and then they would get their money down. He gave 20 cubic feet of gas for 1d. It should really be 22 feet; but the meters cost a good deal more, and they had to charge accordingly.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

SUPERINTENDENT MCGREGOR, of the Pawtucket (R. I.) Gas Company, is completing the placing of a 12-inch gas main, through Cross street to High street, which line was rendered necessary through the largely increased use of gas in the district known as Pleasant View. The new main replaces a pipe of 6-inch diameter.

THE new specifications for the public lighting of Fresno, Cal., originally called for illumination only by means of arc (2,000-candle power) lamps and electric incandescent (32 candle power) lamps. At the meeting of the Board of Trustees, held to consider the specifications, as submitted by the City Attorney (Mr. Smith), among those in attendance were Messrs. Einstein and Gutsch, of the Fresno Gas and Electric Company, whose persuasive powers of argument were such that in the end the authorities "allowed" it would be in order to have propositions for gas and electric lighting submitted. Our understanding is that the gas and electric lighting tenders will be based on what each of the Companies is willing to do.

IT is said that Mr. Charles Gibbons, representing Cleveland (Ohio) investors, is attempting to secure control in the Warren (Pa.) Gas Company.

THE proprietors of the Hempstead (L. I.) Gas Company have reduced the selling rate to $2.70 per 1,000 cubic feet. Although this is a concession (the former gross rate was $3), it looks to us that the Hempstead folks would have been none too liberal had they put the price at $2.50. They have also rearranged their electric lighting schedule, which now puts the rate for each 16-candle power incandescent lamp at $1 per month, instead of $1.25. This, of course, is for an all-night service.

A PECULIAR case of death from the inhalation of gas is reported from Philadelphia. A Mrs. Whelan, residing at 2550 North 12th street, turned on the gas and attempted to light it. In the attempt she fainted, falling to the floor. Some hours elapsed before discovery of her condition was made and the discovery unfortunately proved that she had been fatally asphyxiated.

THE Delaware (Ohio) Gas Company is making an attempt to secure some portion of the public lighting of that place by means of Welsbach lamps. Superintendent Jones has gone into the contest in a clever way, having installed several Welsbachs at points in the city where their merit was sure to attract public attention.

THE proprietors of the Poughkeepsie (N. Y.) Gas Company have made the following announcement:

"On and after October 1st, 1898, bills for gas will be issued monthly instead of quarterly, as heretofore, at the following prices and under the conditions named:

Consumption per Month.	Rate per 1,000.	Discount.
100 to 2,000 cubic feet.....	$2	10 per cent.
First additional 2,000 cubic feet ...	2	15 "
Second " " " ...	2	20 "
In excess of above named quantities,	2	25 "

"All gas used for stoves, engines and heaters will be billed at $1.10 per 1,000, subject to a discount of 10 cents per 1,000. All discounts are contingent on the prompt settlement of bills, by the 10th of each month."

THE Kerr Murray Manufacturing Company, of Fort Wayne, Ind., is constructing a holder for the Portsmouth (Va.) Gas Company, rated to retain 100,000 cubic feet. The contract calls for the completion of the vessel on or before October 15th.

THE Waukegan (Ills.) Gas Light and Fuel Company, for such is the corporate title of the concern that proposes to supply gas in Waukegan, has been organized by the election of the following officers: President, W. I. Osborne; Vice-President, C. T. Boynton; Secretary and Treasurer, Louis M. Grant; General Manager, Lewis Brittain. The net rates for a gas supply are: On illumination account, $1.25 per 1,000; for fuel use, $1.15. The works are to be located on the Lake front, opposite the station of the Northwestern Railway Company—a most eligible site. The contract for the Company's plant has been awarded to the United Gas Improvement Company, and the equipment will include a set of standard double superheater Lowe water gas apparatus, of 250,000 cubic feet daily capacity, purifiers, storage holder, station meter, oil tank and Connelly governor. Also, all the connections and other necessary small parts.

THE following excerpts from the minutes of a recent meeting of the Ithaca (N. Y.) Common Council carry their own explanation:

"*Whereas*, The Welsbach Street Lighting Company, of America, has offered to furnish Welsbach gas lights upon the lines of the gas mains, or wherever they may be extended hereafter during the time of the contract for lighting, for the sum of $30 per year for each lamp, thereby saving the city $1.94 per year on each lamp; and

"*Whereas*, The said Company further agrees to reduce the price of its self-generating gas lamps (employed where gas mains do not reach) from 8¾ to 8½ cents each per night; therefore, be it

"*Resolved*, That the Mayor and City Clerk be, and they hereby are, authorized and directed to execute a contract with the Welsbach Street Lighting Company of America for furnishing, lighting and maintaining 105 or more (as may be ordered by the city) of its Welsbach gas and self-generating gas or naphtha lamps, for a term of 5 years, from Oct. 1st, 1898, in accordance with its proposal of April 26th, 1898. This contract to be in lieu of the present contract with the N.Y. and N.J. Globe Gas Light Company, which contract shall be canceled and destroyed upon the signing of the new contract herein provided for."

A CORRESPONDENT forwards the following: "Mr. W. F. Lawrence, who recently took charge of the plant of the Trenton (N. J.) Gas Light Company, has had much to do this summer, one result of which activity is that plans have been satisfactorily completed for an entire remodeling of the works. A contract for important plant enlargement has been awarded to the American Gas Company, of Philadelphia, which includes the construction of a new stack of 10 benches of 6's, of the well known Kloenne Bredel type. The retort house will be raised so as to accommodate an iron stage floor and coal elevating apparatus. New exhausters and a complete set of scrubbing and condensing apparatus

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(*Continued from page* 351.)

of the Bredel method will also be installed. This means that the manufacturing works, from the bench foundations to the purifiers, will be new. Indeed, as the purifying boxes have been in service perhaps less than two years, the Trenton Gas Company will shortly have an entirely new and modern coal gas plant. The Company's water gas plant is also being overhauled, and important main extensions and renewals are underway. The Company has rented an office building well situated in the business district of the city, and will occupy the same when its remodeling has been completed. The remodeling is being made with a view to adapting the offices to a complete display of the appliances going to show the many uses to which gas may be successfully put in the home, store, warehouse or factory.

A CORRESPONDENT, writing under date of the 31st inst., says: "I note your reference to the proposition, made by the Hon. Peter Primeau and his associates, for the establishment of a gas works at Sault Ste. Marie, Mich., which reference appears in your issue dated August 29th. From the tenor of your reference I judge that you are inclined to disfavor a gas works at the point named; but you should not give yourself any uneasiness over the affair, for it is quite certain that a works will be built, and it is equally certain that those who are to put their money in the enterprise know quite well what they are about. Mr. Primeau, who is well known through this section for his push and business ability, is associated with Mr. Henry G. Beatley, who has been in the gas business for years. For your better information, I inclose the main points in the ordinance establishing and regulating the plant, which ordinance is now before the Sault Ste. Marie Council: The life of the franchise is to be 30 years, and the agreement recites that the Company shall at all times furnish a good, merchantable gas, of not less than 16 candle power, when measured by any standard burner consuming 5 cubic feet per hour; that the maximum sulphur content allowable shall not exceed 20 grains per 100 cubic feet; that the ammonia content shall not exceed 10 grains per 100 cubic feet, and that no sulphureted hydrogen shall be allowed. The maximum charge to consumers may not exceed $1.75 per 1,000 cubic feet, and local mechanics and laborers are to be given preference in the work of constructing the plant. At the end of 10 years the city has the option of purchasing the plant at an appraised valuation, together with 10 per cent., the appraisal to be made by three valuators, one to be named by the city and one by the Company, and the third shall be a judge of the Circuit Court. The Company is to have 12 months after the passage of the ordinance within which to commence the construction of its plant. I say in all sincerity that the place affords a profitable field for a gas company, and I know that Messrs. Primeau and Beatley mean business.—R."

THE personal property of the Austin (Tex.) Gas Light and Coal Company, for purposes of taxation, has been valued at $100,000. The former valuation was $12,500.

MR. J. A. PATTON has been appointed receiver of the properties of the Council Bluffs (Ia.) Gas and Electric Light Company. His appointment is the result of an amicable arrangement made between the bond and stockholders, whereby the mortgage securing the bonds will be foreclosed and the Company reorganized.

THE official title of the Citizens Gas and Electric Company, of Jacksonville, Fla., has been amended so as to make it read Citizens Gas Company. The liabilities of the Company are limited to $100,000.

A RECENT issue of the Williamsport (Pa.) *Sun* said: "The work of laying gas mains on and through the more remote streets of the city is well underway. The work was begun on Campbell street, and from there will run all through the northern portion of the city. Pipe will also be laid in Newberry and South Williamsport. In fact the Company intend to have every street in the city piped, and to be able to furnish gas to any house in Williamsport or South Williamsport. This means the laying of about ten miles new mains, and the work is expected to be completed within the next four months. The work at the Company's plant is also progressing nicely and the contract for the new gasholder, which is to have a capacity of 500,000 feet, has been let to the firm of Bartlett, Hayward & Co., of Baltimore, Md., who will begin its construction in a few days. The corner store room, in the building situated at the northeast corner of Fourth and William streets, is being entirely remodeled and made into offices which will be occupied shortly by the new Company." The Williamsport Company is now controlled by New York capitalists.

Concentration of Power by Electric Transmission.

One of the most forcible of the advantages of electrical transmission of power, says the *Electrical World*, is that this method often makes it possible to combine two or more steam plants into one, greatly diminishing the cost of labor and supplies. Such an advantage appeals especially to the mill owner, who may operate shafting in several buildings or departments by separate sources of power. A conspicuous example of this wasteful arrangement is in the works of one of the largest locomotive shops of the country, where part of the plant is operated by water power, part by steam power, and part by compressed air, the latter necessitating an extra engine and compressor. The polyphase system of electric transmission as developed by the Westinghouse Company has made it possible to centralize the power in such shops. When Lieutenant L. O. Garrett took charge of the affairs of the Atlas Tack Company, of Taunton, Mass., as Manager, he instituted a thorough investigation as to the power required for the various classes of tack making machinery under normal conditions. The mills of this Company at Taunton are three in number, located from 800 to 1,200 feet apart, and were until recently operated by three separate steam plants, with the accompanying wastefulness incident to small units. It was found that, owing to variations in the amount of power required from day to day for the different classes of work, the duty of the three steam plants could be easily performed by a single steam plant of two-thirds their united capacity. So large a saving in coal and labor as was expected from this arrangement induced Lieut. Garrett to engage the services of T. W. Sprague, of Boston, Mass., to investigate jointly with him the various systems of transmission. The parties interested inspected personally a number of the principal polyphase plants among the New England mills, and finally selected the Westinghouse three-phase system, 3,600 alternations, as best adapted to the work of the Atlas Tack Company. This system, in connection with the Tesla "Type C" motors, made by the Westinghouse Electric and Mfg. Company, has, it is stated, attained marked success in every instance in which a plant has adopted it, and the alternate current motor, though developed later than the direct current motor, has been favorably received in all such installations. The Atlas Tack Company is to use a 150-k.w. Westinghouse generator, which will operate nine Tesla induction motors of the above type, ranging from 3 to 50-horse power, in the various mills. The gas lighting system of the mills will be replaced by abont 1,000 incandescent lights.

The Market for Gas Securities.

The market for city gas shares was quite erratic during the week, and the net result of the trading is a loss. Consolidated sold up to 191, and to-day (Friday) the quotation at noon was 187½ bid; of course, the dealings now are ex-dividend of 2 per cent., payable the 15th inst. Other city shares are notably weaker, Standard common showing a loss of five points, while the decline in Mutual is fully equal to seven points. The New Amsterdam specialties are evidently being held up by those in control. The reason for the general weakness is still assigned to the competition for business between the New Amsterdam and the other Companies. We do not think the competition will amount to much. Brooklyn Union shows an advance of five points over the price of last week. In out-of-town shares, Peoples, of Chicago, easily occupied first place, with quite a range in the quotations. To-day it was reported at 106¾ to 106½. Baltimore Consolidated holds its own fairly well. Cincinnati gas is 206½ bid.

Gas Stocks.

Quotations by Frederic B. Cochran & Co., Brokers and Dealers in Gas Stocks.

20 and 22 Broad Street, New York City.

Sept. 5.

☞ All communications will receive particular attention

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$36,230,000	100	187	..
Cental Union, Bonds, 5's	3,000,000	1,000	103¾	104
Equitable Bonds, 6's	1,000,000	1,000	105	.
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	.	108	112
Mutual	3,500,000	100	325	330
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	
New Amsterdam Gas Co.	13,000,000	100	29	30
Preferred	10,000,000	100	70	71
Bonds, 5's	11,000,000	1,000	101½	..
Northern Union, Bonds, 5's	1,250,000	1,000	94½	95½
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	111	113
" 1st Con. 5's	1,500,000		107½	108½
Richmond Co., S. I.	348,650	50	70	..
" Bonds	100,000	1,000		
Standard	5,000,000	100	138	143
Preferred	5,000,000	100	158	165
Bonds, 1st Mortgage, 5's	1,500,000	1,000	112	114
Yonkers	299,65	500	180	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	127½	128
" " Bonds (5's)	15 000,000	1,000	115	115⅛
Bay State	50,000,000	50	3⅜	3½
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	..
" 1st Mtg. 5's	450,000	1,000	..	..
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	92	..
2d " " "	3,000,000	1,000	..	80
Buffalo City Gas Co.	5,500,000	100	22½	23¾
" " Bonds, 5's	5,250,000	1,000	95½	96
Central, San Francisco	2,000,000	..	105	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Columbus	1,144,700	100	89	91
1st Mortgage	1,207,000	1,000	101	103½
Consumers, Jersey City	2,000,000	100	78	85
" Bonds	600,000	1,000	101½	103½
Cincinnati G. & C. Co.	8,500,000	100	206	207
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Consolidated, Baltimore	11,000,000	100	65¾	66¼
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	..
Consolidated Gas Co. of N.J.	1,000,000	100	16	21
" Con. Mtg. 5's	380,000	1,000	75	80
Consolidated G. & E. Co.'s, Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,500,000	50	61	..
" Prior Lien 5's	4,538,000	1,000	94¼	94½
Detroit Gas Co., 5's	428,000	1,000	..	..
" Inc. 5's	84,000	100	..	..
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	75	80
" Bonds	2,000,000	..	88	
Grand Rapids Gas Lt. Co.	1,000,000	50	..	..
" 1st Mtg. 5's	1,125,000	1,000	..	..
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	115	125
" Bonds, 6's	2 650,000	..	106	107
Jackson Gas Co.	250,000	50	..	..
" 1st Mtg. 5's	250,000	1,000	..	..
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	78	83
Bonds	1,000,000	1,000	90	91
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	50½	51
Preferred	2,500,000	100	94¾	96
Bonds	10,000,000	1,000	105	105¼
Madison Gas & Elec. Co.	400,000	100	..	..
" 1st Mtg. 6's	350,000	1,000	..	..
Montreal, Canada	2,000,000	100	200	..
Newark, N. J., Gas Co.	1,000,000	..	200	220
Bonds, 6's	4,000,000	..	128	130x
New Haven	1,000,000	25	252	..
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	52	53
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	106⅜	106½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	88	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	85⅝	86
St. Paul Gas Light Co.	1,500,000	100	49	51
1st Mortgage 6's	650,000	1,000	84	87
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,428,000	1,000	80	82
St. Joseph Gas Co.	1,000,000	100	..	..
" 1st Mtg. 5's	750,000	1,000	..	..
Syracuse, N. Y.	1,750,000	100	16½	17½
Bonds	1,500,000	1,000	94	97
Washington, D. C	2,000,000	20	250	..
Western, Milwaukee	4,000,000	100	85½	86
Bonds, 5's	3,556,000	.	101¾	102½
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DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, Aug. 11, 1898.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Sept. 9, 1898, to stockholders of record at the close of business Aug. 31, 1898. Transfer books of the preferred stock will be closed from Sept. 1 to Sept. 9, 1898, both inclusive. Checks will be mailed

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Twelve or Sixteen Bredel Mouthpieces, in Good Shape.

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A Small Gas and Electric Light Plant,

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Hydraulic, Dip, Branch and Ascension Pipes, Mouthpieces and Lids, for four Benches of 5's and for one Bench of 3 retorts.

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D-Shaped Tar Extractor, 8 ft. long, 1 ft. 6 in. deep.

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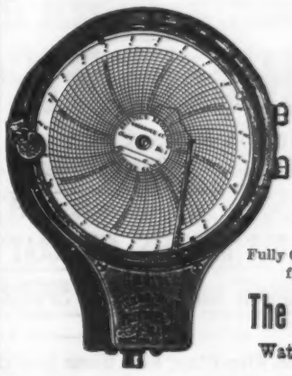

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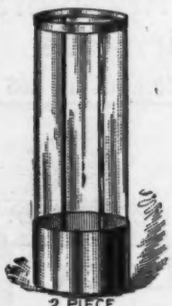

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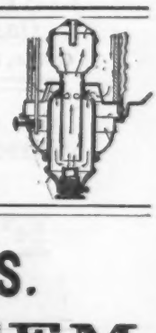

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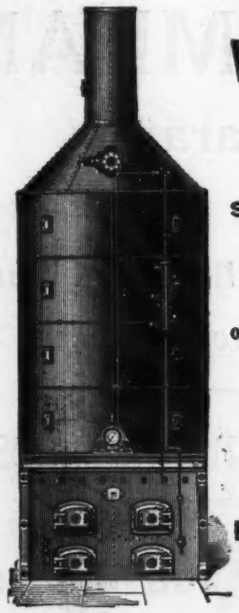

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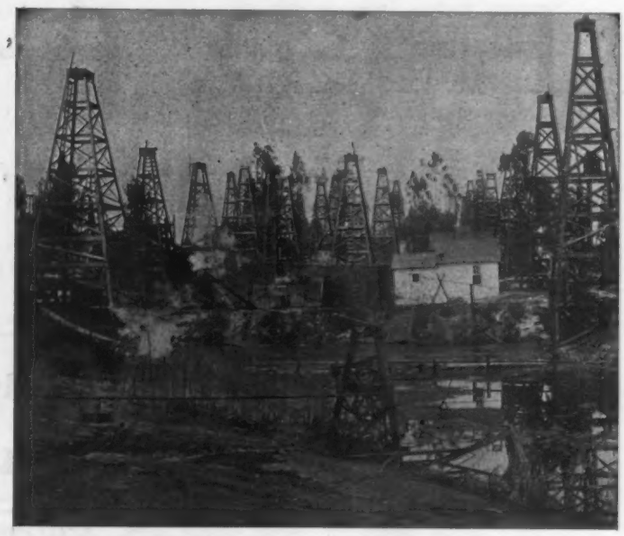

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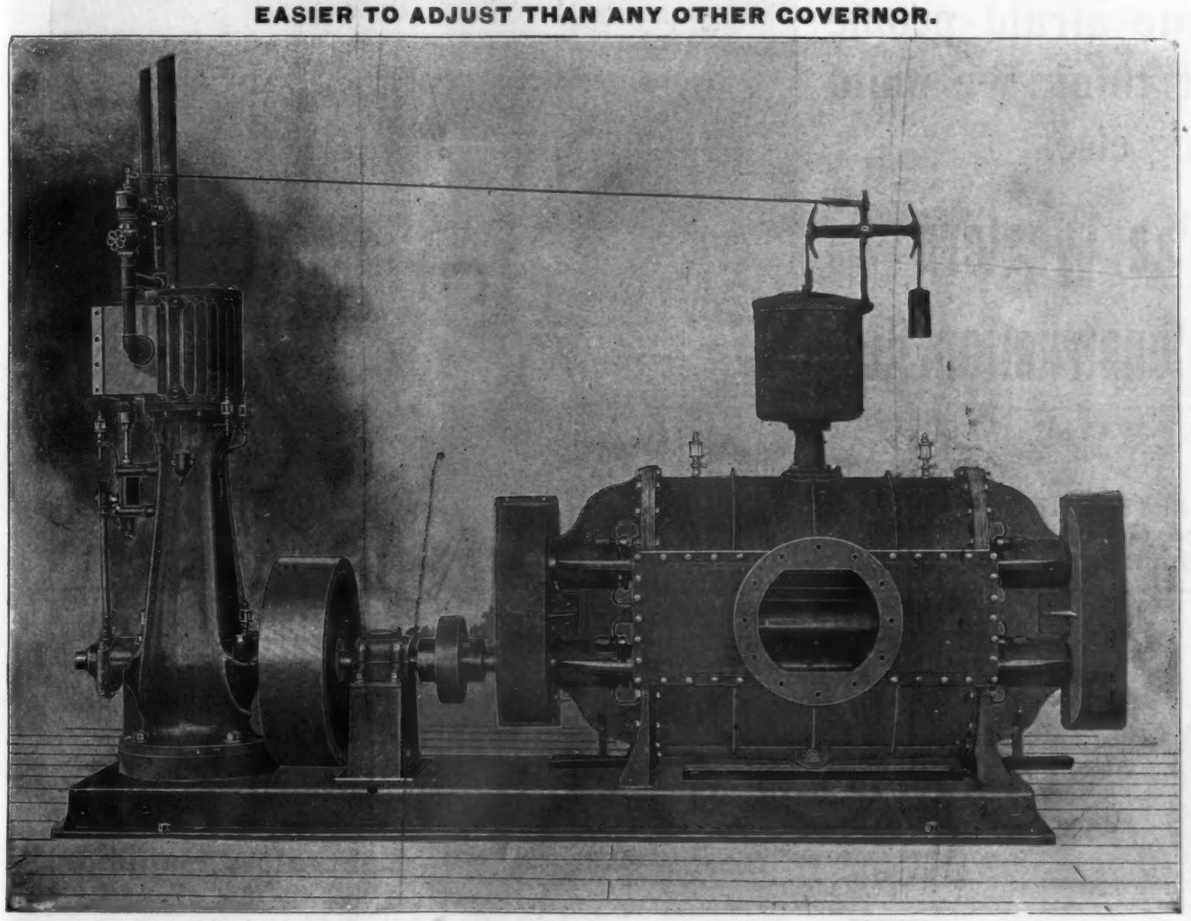

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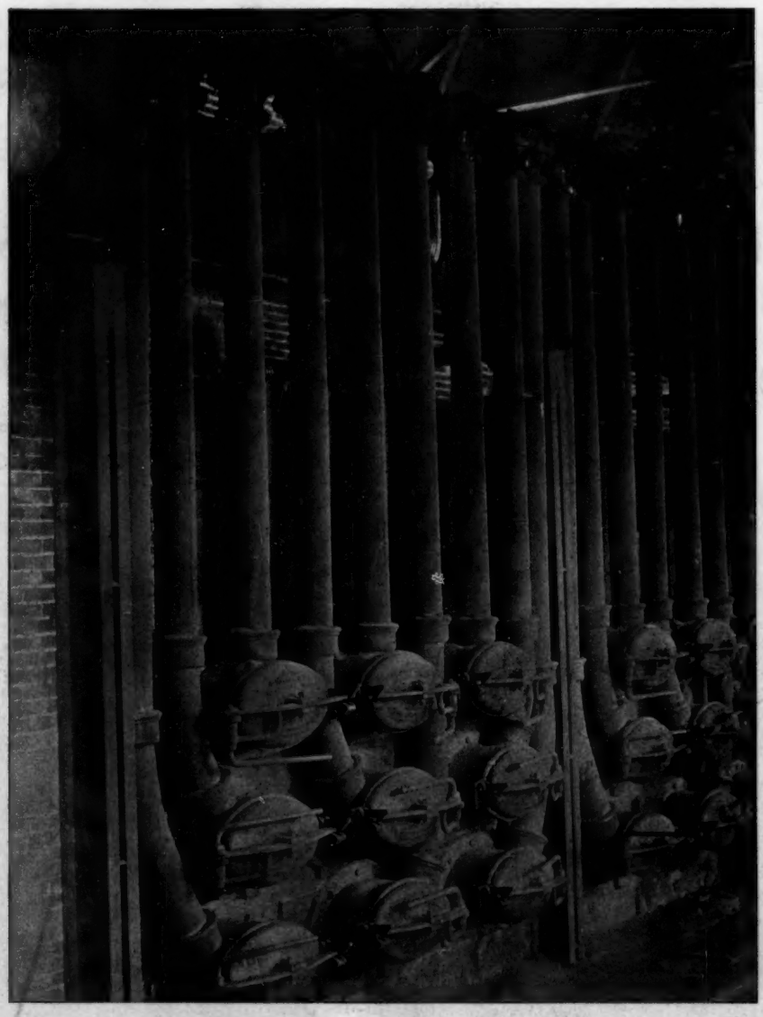

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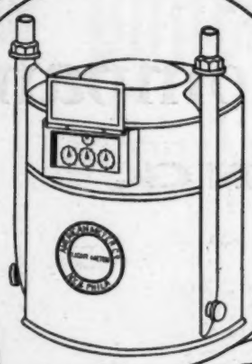
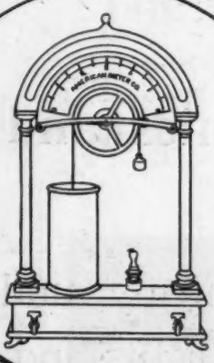
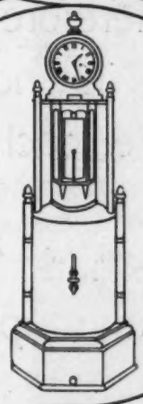
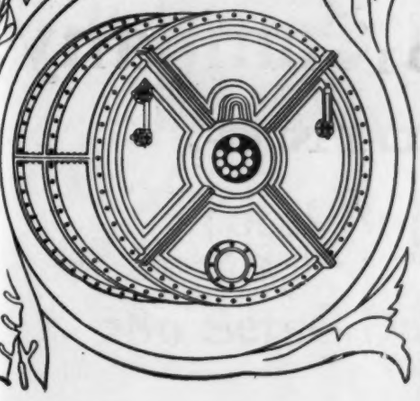








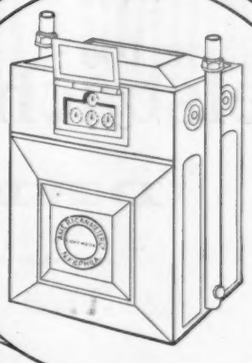
PUBLIC LIGHTING TABLE.

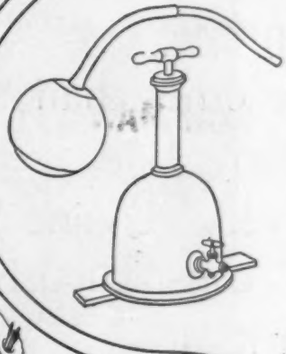
SEPTEMBER, 1898.

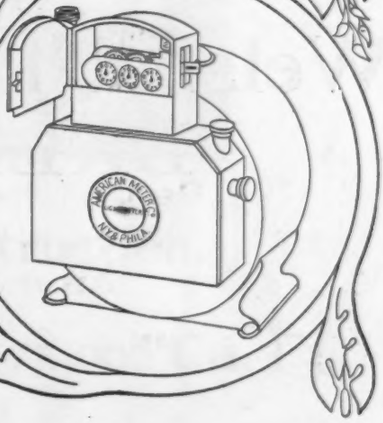
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguist.
				P.M.	A.M.
Thu.	1	No L.	No L.	6.30	4.20
Fri.	2	7.00 PM	8.20 PM	6.30	4.20
Sat.	3	7.00	8.50	6.15	4.30
Sun.	4	6.50	9.20	6.15	4.30
Mon.	5	6.50	9.50	6.15	4 30
Tue.	6	6.50	10.30	6.15	4.30
Wed.	7	6.50 LQ	11.20	6.15	4.30
Thu.	8	6.50	12.10 AM	6.15	4.30
Fri.	9	6.50	1.10	6.15	4.30
Sat.	10	6.50	2.10	6.05	4.40
Sun.	11	6.40	3.10	6.05	4.40
Mon.	12	6.40	4.40	6.05	4.40
Tue.	13	6.40	4.40	6.05	4.40
Wed.	14	6.40	4.40	6.05	4.40
Thu.	15	6.40 NM	4.40	6.05	4.40
Fri.	16	6.40	4.40	6.05	4.40
Sat.	17	6.40	4.40	5.55	4.50
Sun.	18	6.30	4.50	5.55	4.50
Mon.	19	6.30	4.50	5.55	4.50
Tue.	20	7.30	4.50	5.55	4.50
Wed.	21	8.20	4.50	5.55	4.50
Thu.	22	9.20 FQ	4.50	5.55	4.50
Fri.	23	10.30	4.50	5.55	4.50
Sat.	24	11.40	4.50	5.40	5.00
Sun.	25	1.00 AM	4.50	5.40	5.00
Mon.	26	2.10	4.50	5.40	5.00
Tue.	27	3.20	4.50	5.40	5.00
Wed.	28	No L.	No L.	5.40	5.00
Thu.	29	No L. FM	No L. ●	5.40	5.00
Fri.	30	No L.	No L.	5.40	5.00

TOTAL HOURS LIGHTING DURING 1898.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	210.40	January	423.20
February	186.40	February	355.25
March	181.20	March	355.35
April	166.10	April	298.50
May	156.40	May	264.50
June	144.30	June	234.25
July	147.30	July	243.45
August	157.10	August	280.25
September	169.50	September	321.15
October	186.00	October	374.30
November	204.30	November	401.40
December	218.30	December	433.45
Total, yr.	2129.30	Total, yr.	3987.45







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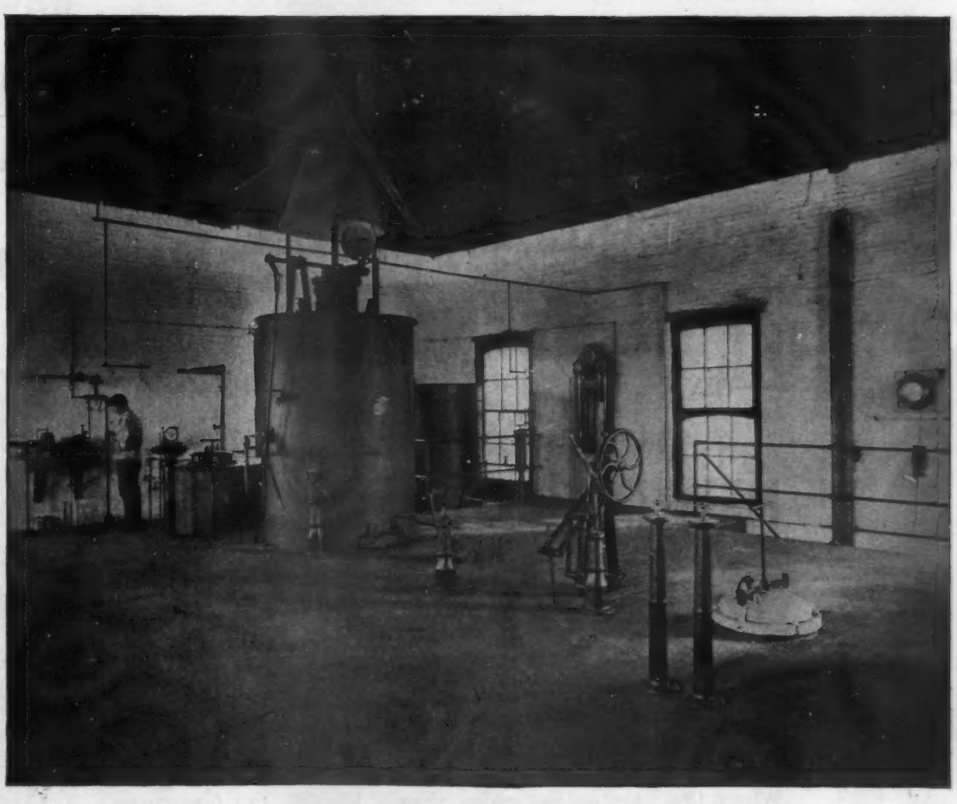

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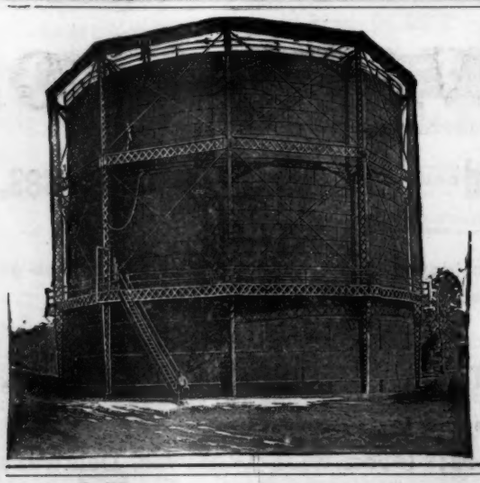

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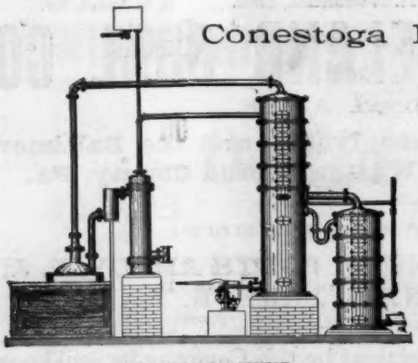

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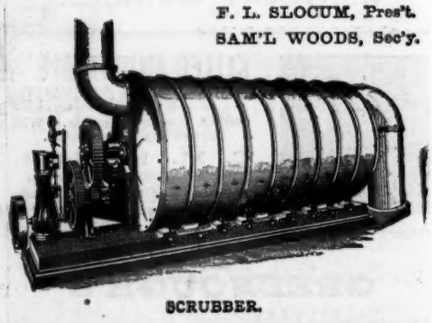

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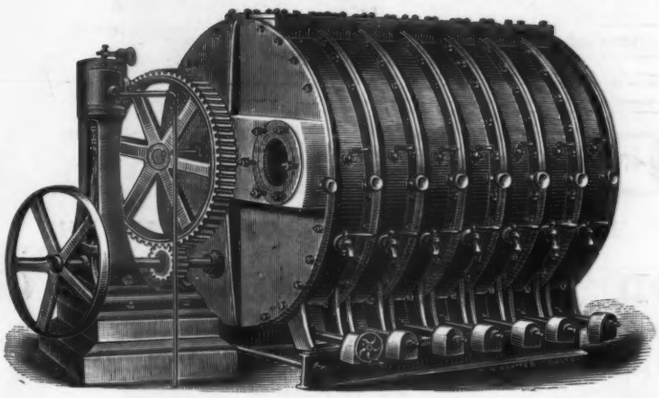

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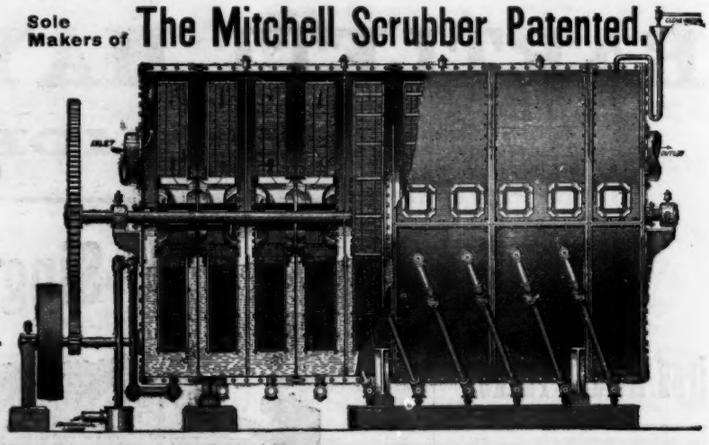

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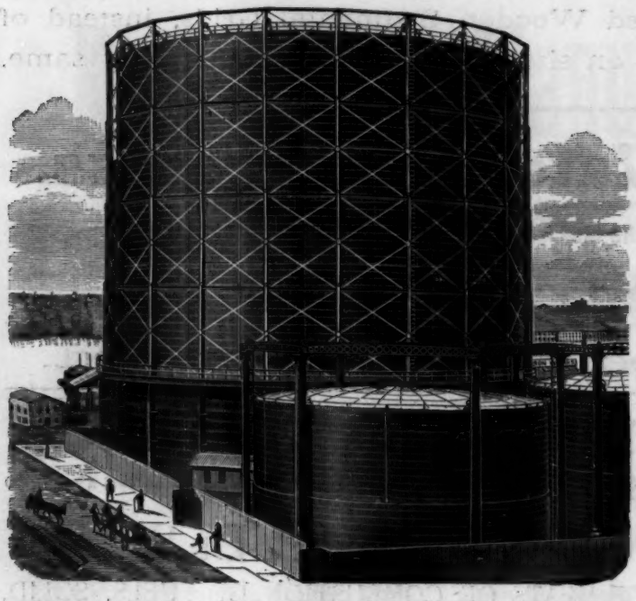

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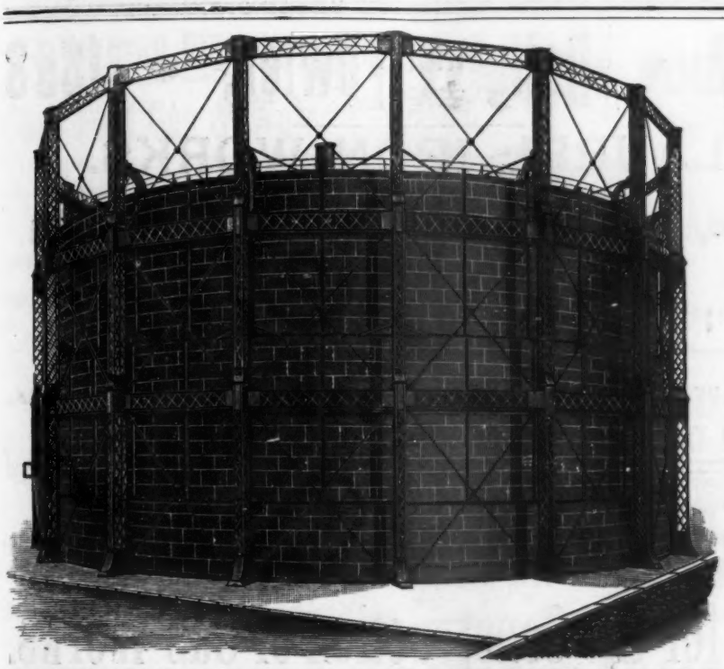

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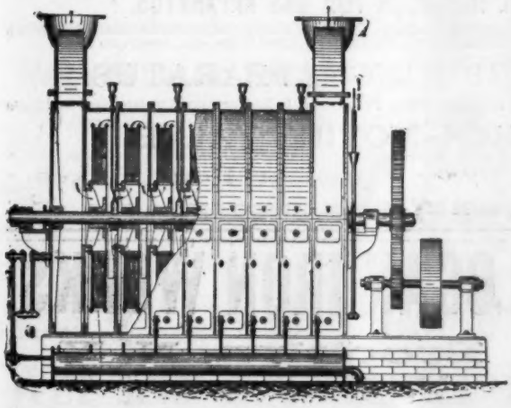

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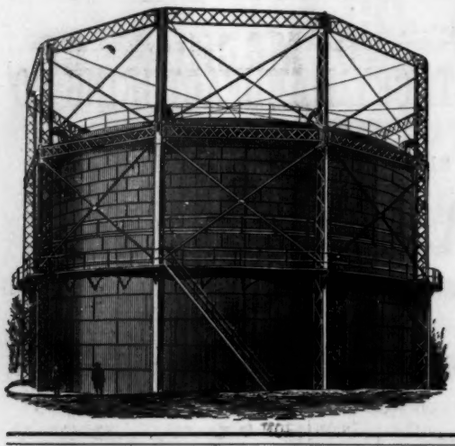

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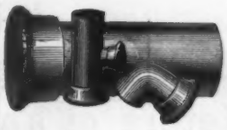

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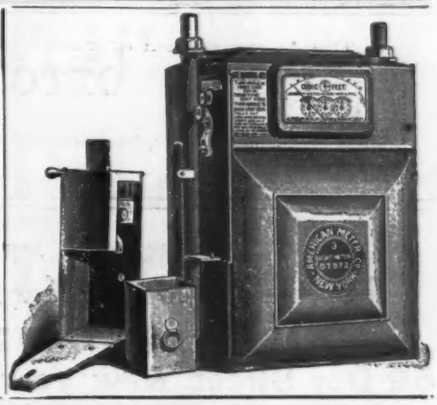

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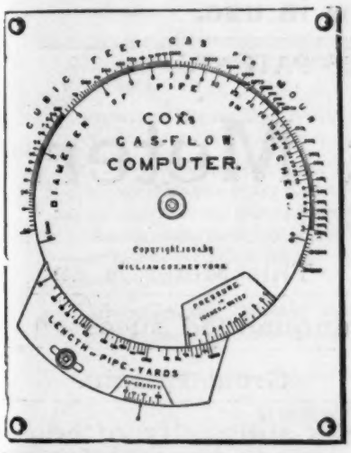

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